MODEL AIRPLANE NEWS

MARCH 1951 - 25 CENTS

RUSSIAN MIG 15

ANNOUN

TESTORS

SENIOR SUPER STUNT KITS

...in "9", "19", and "29" models for the McCOY "9", "19", and "29" engines

THIS TESTOR KIT IS RATED — AS INDICATED BELOW — IN ACCORDANCE WITH FOUR APPROVED ACHIEVEMENT LEVELS OF CONSTRUCTION AND FLIGHT PERFORMANCE:

● 1st KIT FRESHMAN TRAINER	● 2nd KIT SOPHOMORE STUNT TRAINER	● 3rd KIT JUNIOR STUNT	● 4th KIT SENIOR SUPER-STUNT
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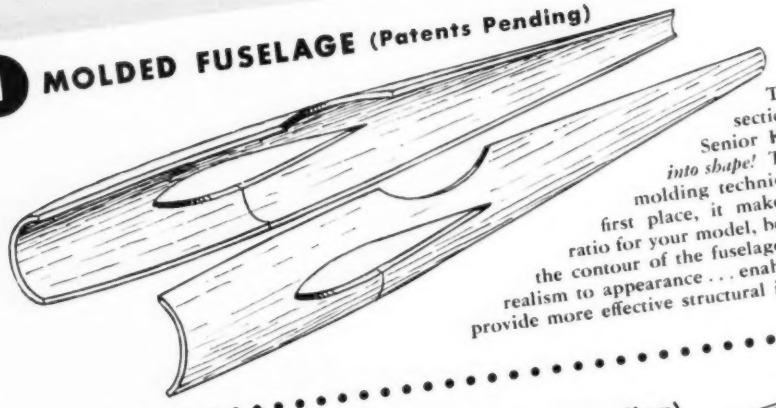
...featuring 2

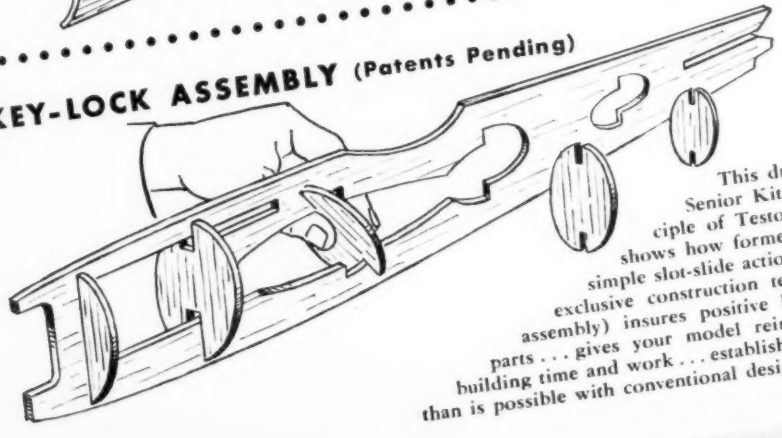
REVOLUTIONARY NEW DEVELOPMENTS

1 MOLDED FUSELAGE (Patents Pending)



This drawing shows two fuselage half-sections just as you find them in a Testor Senior Kit. *Note that they are actually molded into shape!* The importance of this new and exclusive molding technique cannot be over-emphasized. In the first place, it makes possible a higher strength-to-weight ratio for your model, because the grain of the wood now follows the contour of the fuselage. Furthermore, the molded sections add realism to appearance . . . enable you to obtain a more perfect finish . . . provide more effective structural integration.

2 KEY-LOCK ASSEMBLY (Patents Pending)



This drawing of keel and formers in a Senior Kit illustrates the construction principle of Testor's new "Key-Lock" assembly . . . shows how formers fit securely into place with the simple slot-slide action of a key turning in a lock. This exclusive construction technique (also used for wing rib assembly) insures positive location and correct alignment of parts . . . gives your model reinforced structural rigidity . . . saves building time and work . . . establishes a higher strength-to-weight ratio than is possible with conventional design.

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(WOODWORKING DIVISION) **ROCKFORD, ILLINOI**

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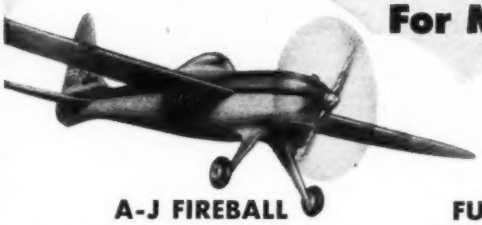
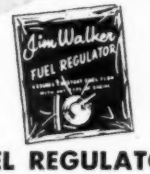


A-J FIREBALL

The original U-Control plane. High maneuverability for stunt flying. Kit includes control handle, flying lines, wheels, everything but motor and liquids. **$6.95**



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MODEL AIRPLANE NEWS

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MARCH, 1951 VOL. XLIV—NO. 3

CONTENTS

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IT IS New Year's Eve as this is being written, and 1951 is but a few hours away. Christmas was celebrated everywhere with a sober enthusiasm. For most of us, it was a normal Christmas, despite the uncertain future.

Because model builders will view the coming flying months with the same feeling of it possibly being the last normal season, we may see the greatest series of well-supported contests in history. Nineteen fifty-two? Might as well try to predict 1975! But the chances are good for a swell season in '51. While government controls applied after the Chinese intervention will certainly affect our industry, we modelers are fortunate to have the engines and materials to insure a good summer's flying. New engines are still being announced! You can still buy rubber, but the switch from natural to synthetic rubber in many trades bodes ill for model builders. If all manner of handicaps may exist in the future, we can make 1951 a humdinger while it lasts!

With the prospect that engines may become scarce—and some major manufacturers already are deep in military work—all of us should do some sensible planning. We should take better care of engines. If the supply of motors becomes short, it would amount to a crime to permit an airplane to fly out of sight, or to be careless in the care and operation of a motor. We should consider the possibility that the rules might need to be amended to call for the disqualification of any contest entrant whose airplane does not feature a dethermalizer preferably of a non-fuse type. More than that, any entrant whose ship winds in in free flight should be disqualified from further flights in the same event at that contest. If we modelers have to contemplate the possibility of being put out of the running because we can't control our airplanes properly, the incidence of splattered planes and engines will be reduced markedly. Drastic treatment, true! Thousands of dollars worth of engines were smashed at the last Nationals; during the 1950 season, many tens of thousands of dollars worth of motors and materials were criminally wasted.

Let us hope that it never becomes necessary but, perhaps, the number of official flights could be reduced to two, rather than the present three. Most contests are rat races, especially the larger ones, where ambitious entrants run themselves into the ground trying to compete in the maximum number of events. Less pressure would make a contest more enjoyable, give more time for chats with other entrants that we see only once or twice a year. More time would mean more attention to the flying of any given model. Less flights would have a direct effect on the numbers of broken and lost machines. Shorter engine runs in U-control events would conserve fuel; reduce the stunt pattern and step up the judging. It is not uncommon today for a really active modeler to tote along the better part of a gallon of fuel. Speaking of disqualifying entrants for abuse of engines, dare it be considered to put out of the running any speed merchant who nips a prop for a runaway engine? Would penalties make a stunt pilot less apt to crack up? How about knocking 5 sec. off the engine run in free flight? The higher a ship climbs, the greater are its chances of being lost.

Two flights instead of three would make the rubber last long, too. Just as the gas modeler should keep dust out of an engine, and clean his mill thoroughly when dirt does get into it, the rubber man should keep his "motors" clean, remove them from the ship between contests—right after that last flight—and store them loosely in a dark, cool place. If balsa, silk, nylon and other materials are to be scarce, it would be a good thought to suspend competition in the larger model-size classes. How many airplanes in the AA size could be made out of the stuff that goes into a modern C monster? Why not limit stunt to approximately 40" spans? Or rubber to 150 sq. in. Perhaps it would be desirable for the AMA rules' committee to examine these questions and, for the duration of a materials shortage period (when it begins), modify existing events. What would be the matter with a single rubber event? Or with just AA and A in free flight?

If a period of tight supply lies ahead, we can learn much from the experience of the war years. After Pearl Harbor, manufacturers turned to substitute materials with commendable ingenuity. Magazines published articles and plans for models, mostly gliders, made from hard wood and stiff paper. Strange things happened and no one knew quite how they happened or the price airplane modeling was to pay—after the war was over. One of the strange things was the more experienced modeler's contempt of any substitute material; if he couldn't have his motors and balsa ,he'd just read his favorite magazine thank you, and leave the hard wood whittling to others. Perhaps we were a spoiled bunch for many foreign countries always have had to use just such substitutes as their main dish and things like balsa were a dream. In the early thirties we had gotten away from brads and brass and that was that.

On the other hand, hundreds of thousands of kids got fired up by the deeds of Mustangs and the rest and bought any box that bore the name of a plane. The industry swelled to more than a $30,000,000 gross and, just before the bottom fell out in 1946, was estimating a volume of $50,000,000 a year. Materials got so scarce that many lines of kits got to be thought of in terms of boxes and prices. The post war adjustment was inevitable but when the reaction set in to this wartime stuff that cluttered shelves after VJ day, a lot of people went out of business. No one will ever know how many thousands of prospective modelers were lost to the hobby. For a while, a model airplane kit was the last thing on earth that a parent would buy for junior. Pa knew darn well he couldn't put it together.

Now all this has been repaired by a post war industry which has forged ahead with prefabrication, good cheap engines, and numerous accessories that make old timers rub their eyes. Both model builder and manufacturer should strive to hold the standards as big as possible. We know they will be equal to the task.

One of our New Year's resolutions is to learn how to stunt . . . a little. Meanwhile, an attentive ear is being bent to all comments, trivial or informative. For example, we learn that Bob Palmer flies with the handle upside down. When he wants up he really gives it down, and vice versa. What is behind this? Well, it seems that

(*Turn to page 7*)

NEW!

FOR CLASS ½A CONTESTANTS

A new contest has been added in the

1951 NATIONALS!

New Clipper* Cargo Competition for the class ½A model plane carrying the greatest payload. Send for rules NOW—be ready to WIN Cash Prizes!

• In addition to the PAA Load Event, sponsored by Pan American for the past three years—a Special Clipper Cargo Event is open this year (at the Nationals only) to contestants of all ages. The winner will be the entry carrying the greatest amount of pay load in an official flight and landing it safely with load intact. Select your own items to be carried for the Clipper Cargo Competition. No dummy required.

*Trade Mark, Reg. U. S. Pat. Off.

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Standard PAA Load Events for The Nationals and other contests this year will be in ½A and in a combined A & B classification.

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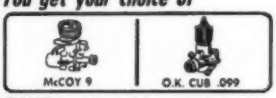

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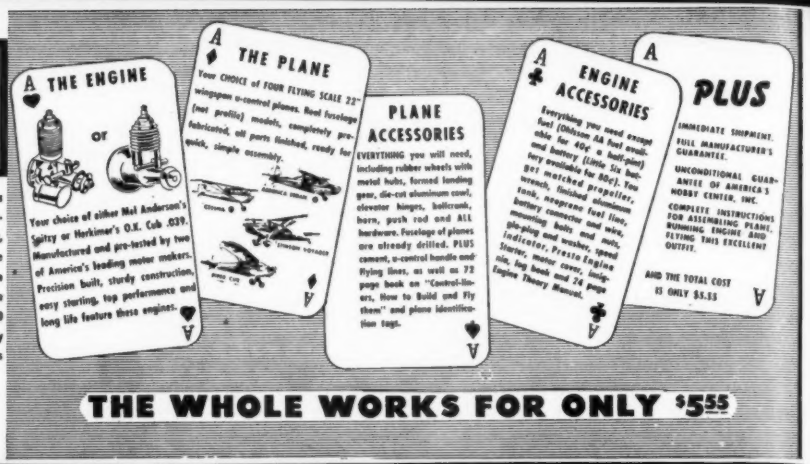

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SCRAP BOX

(*Continued from page 2*)

when Bob first flew one of these things he happened to pick up the handle in that manner and he has been flying that way ever since. Then there is the case of Dave Slagle who retired from competition. One of our spies was witness to a recent Slagle flying session. Dave did five consecutive inside loops, five consecutive outside loops, inverted flight and recovery, and numerous consecutive horizontal eights, all on the same flight. With a 29-powered Chief, on 50-foot lines of .018 thickness. And what is so unusual about this? The motor wasn't running! Dave was whipping.

Still on stunt: Nat Rambo, attending Penn State, cautions, "You are dealing with a quite complicated subject in your January Scrap Box. In general, thick wings have more drag than do thin ones of the same area. Also, a symmetrical airfoil of finess ratio down around three may give negative lift for certain positive angles of attack. Cub lift struts were notorious for this before modification." Imagine that! If stunt gets more complicated we'll settle for a profile.

Don Donahue, that perennial cagey contestant from way back, tosses in enough issues to keep the pot boiling for the next two years. Don is against: "Grown-ups flying their models under the kid's name in the junior events; senior and open fliers using friends, fathers, and relatives' models at National meets (an ancient custom, by the way); poor prizes at the National Meet, old worn out trophies; deadline of registrations at the Nationals (Bill Krecek traveled 3,000 miles, helped process flying scale, then couldn't compete in outdoor stick because he didn't register by 2:00 on the big day); flying of scale during windy conditions."

You touch a responsive chord, Don. Years ago, when we used to make a new flying scale job every day, all summer along, wind was a cursed evil. Practically every scale event at the Nationals seems to be flown in a wind. You see these beautiful jobs, all wound and ready to go. The owner touches them down like a guy going to the guillotine. Follows a grewsome wingover and the sweeping of pieces into a basket. As Don points out, it is 500 to 1,000 hours gone for nothing. Small wonder the event is not popular.

Don is for some things, too: reorganization of AMA with a new constitution, a tie-in with the Boy Scouts to promote the junior movement, more aid and help to clubs; and new international rules. For international competition, Don would like to see a rubber event consisting of Wakefield only for Open classes, 150 sq. in. for Senior, and a 100 sq. in. deal with no weight rule for the Juniors. Free flight gas he sees as being from .00 up to .65 for Open, .0 to .20 for Seniors, and Juniors from .0 to .05. For gliders, Open would be the FAI Swedish cup class; Senior a 300 sq. in. maximum wing area; and Junior, a hand launched all balsa type. In speed, Don likes the looks of .0 to .65 for Open, .0 to .30 for Senior; .0 to .05 for Junior. Radio control would be for Senior and Open only, and there'd be an exhibition class including indoor, stunt, and scale. There's something to chew over!

Lo Salisbury, the Huntington Park, Calif. man who made a name for himself in Wakefield last year, tells us that in placing second in the semi-finals last year, first at the finals, and sixth in Finland, he never made a five-minute flight. Of the 9 flights he made only three went for more than four minutes. Lo's current problem, like that of Wakefielders the world over, can be summed up in one word: Ellila.

"I'm now at work on a new design,'" Lo tells us. "I know there is room for improvement but I don't know about beating Ellila's times. That looks mighty rough! A lot of builders will try gears. I'm not as yet, hoping to get another 30 sec. of motor without sacrificing altitude. That would put my times over 4 min." This guy Ellila, with his two successive wins in the Wakefield finals is a tough, tough problem. And, once again, the finals have to be fought out on his home ball park where, last year, the thermaless weather was so moist that at times water actually ran off some of the airplanes. From where we sit it is not inconceivable that Ellila, too, is going to add another 30 sec. to his times.

E. G. Currington, Manchester, England, wields a long sharp needle. He prods the Scrap Box, the juniors, American modelers and everything stickable in sight. We can take it, if you can!

"Having just received my December MAN, read your comments re: the Wakefield," says Currington, "and feel it my duty to put you in your place. You say—let's modernize the Wakefield—make it AA, etc.; also it is above the heads of the kids. Why not be honest and admit that because America hasn't won it, we must change the rules. Surely, the obvious solution is to increase your standard of modeling to a level at which you stand a chance.

"You seem to have a bee in your bonnet about the juniors," goes on Currington, honing his needle. "Of course, juniors are an asset if kept in their place but too many of them think that, because they are juniors and, because they have luck once or twice, they rule the roost. There is still a lot of sense in the adage, 'Children should be seen, but not heard.'

"I see that you weren't able to send a team to Finland. Surely, with your resources that should have been easy. We had to scrape the bottom of the barrel and rely on donations from our clubs (the main source of income last year was a raffle, the prizes being free trips to Finland, Sweden, etc.). We were able to raise 700 to 1,000 pounds, sufficient to send a team to the Wakefield and one to the glider competitions in Sweden. One would think that, comparing respective populations, your task would be easier. Is the trouble too many juniors?" Harumph. **by BILL WINTER**

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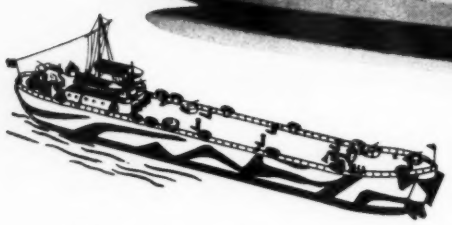
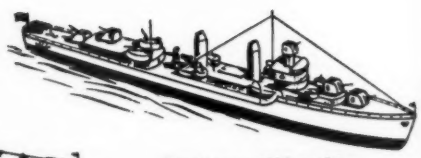


Battleship USS Missouri

Scene of Japanese surrender, World War II. In action in December off Korean coast.



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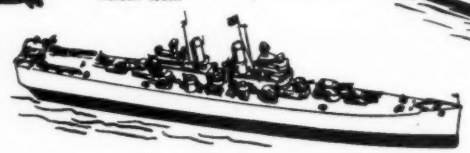

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stunt outlook for '51

Practice, familiarity with rules, a good airplane are three musts. And there are the tricks of the trade!

by JOSEPH WAGNER

EVERY model builder knows of at least one controline flier who can seemingly make his ship do everything except sit up and talk; who goes to contests and takes home the hardware while less accomplished modelers stand around in envy, asking each other, "How does he do it? What is his secret?"

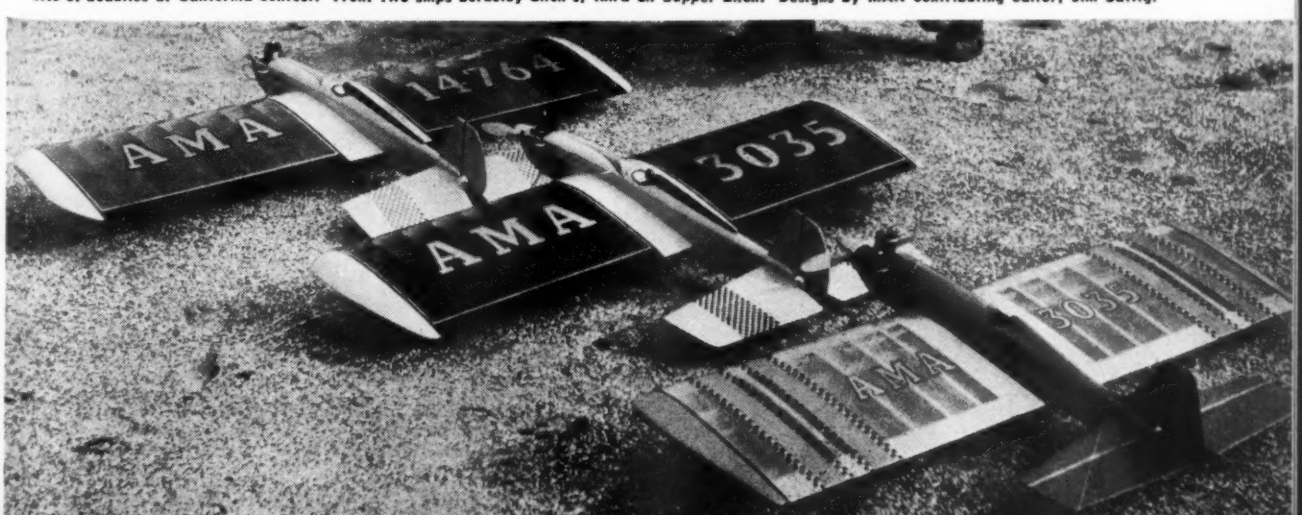
The first and most important secret of the consistent contest winner is nothing more than constant practice. The second is complete familiarity with the contest rules, and obedience to them. And the third is a good airplane.

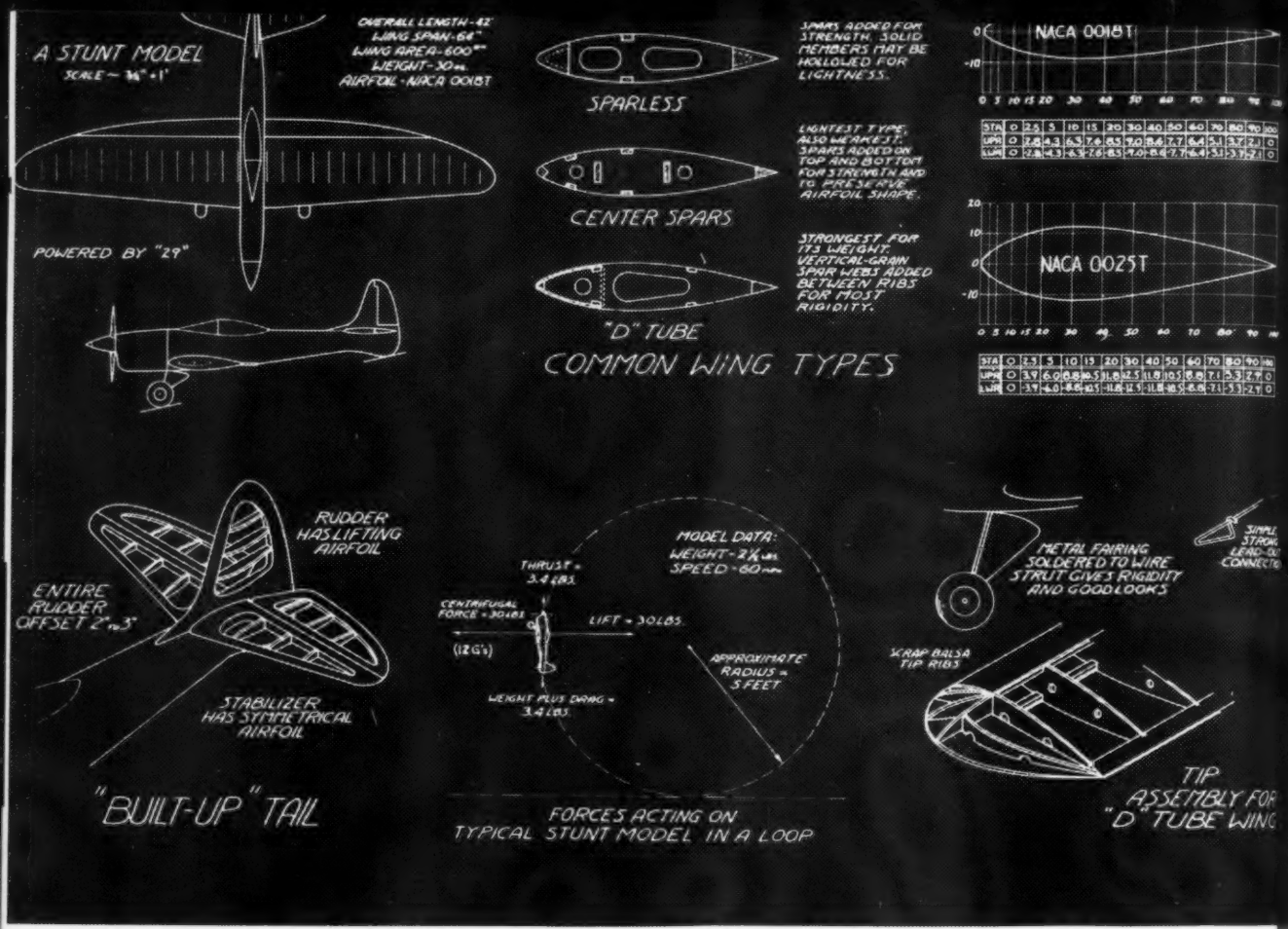
Most contest fliers use more-or-less modified kit models. Why? Because they know that a lot of design and testing has already gone into the kit model by the time it goes on sale, and that it is capable of good performance. However, they also realize that all kit models represent a compromise; between high performance on the one hand, and cost and prefabrication on the other. Naturally, some are better fliers than others, but all can be improved by the builder who is willing to spend a little extra time in doing so. Now, the questions arise: How can you tell a good stunt ship from another not so good? How do you go about improving a kit model? What about original designs?

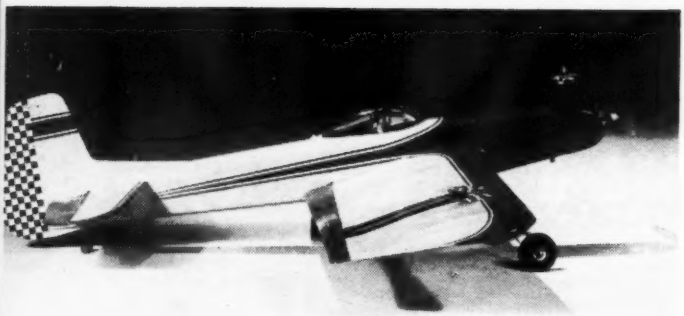
The most important fact that must be faced is that centrifugal force, that does so much for the controliner in keeping the lines taut, is the model's greatest enemy when it attempts tight, smooth maneuvers. The same force that blacks out the pilot of a real plane in a sharp pull-out, can play havoc with the flight path of a stunt model. In a small loop, for instance, the weight of a model may be increased as much as 20 times! But, although the weight of the model is greater, the wings still remain the same size; so that the surfaces that were quite ample to lift the model from the ground may not be able to maintain flight under the added load. When this happens, the model stalls, and a rough or mushy maneuver results.

The number of times a model's weight is increased (G's) in any maneuver depends on three things: the model's weight, its speed, and the size of the maneuver. A model weighing 40 oz. will develop twice as many G's as one weighing only 20 oz. A loop 10′ in diameter gives twice as many G's as a 20′ loop. But a model that flies at 80 mph develops four times as many G's as one that travels at 40 mph. For the benefit of those with a knowledge of elementary algebra, the formula for the number of G's developed by any model in any maneuver is:

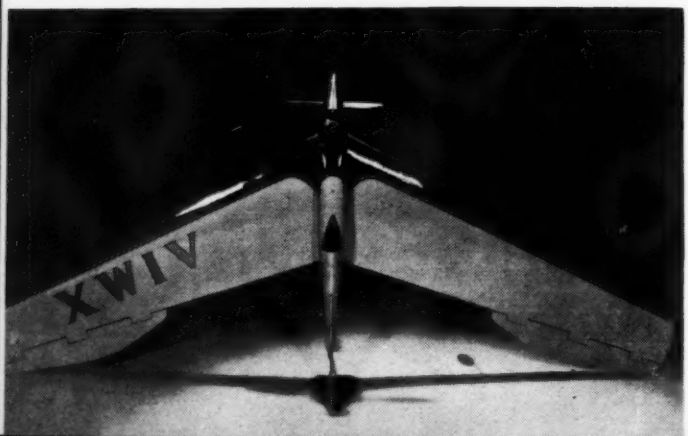
Trio of beauties at California contest. Front two ships Berkeley *Zilch*'s, third *Lil Dupper Zilch*. Designs by MAN contributing editor, Jim Saftig.







Veco stunter incorporating distinctive airfoil and wing flaps that move opposite to elevators. Below—A test flying wing with flipper surfaces located at the wing tips.



$$G = \frac{.00668\ WS^2}{R}.$$

G is the number of times the model's weight is multiplied in the maneuver; W is the model's weight in pounds; S is the model's speed in mph, and R is the radius of the maneuver in feet.

From this, certain conclusions are obvious: the weight of a stunt model should be kept at an absolute minimum; in competition, the largest maneuvers permitted by the rules should be made; and, most important of all, the model should be flown at the slowest speed that allows easy completion of the stunt pattern. These are the essentials of prize-winning performance. Unfortunately, there are several other factors that must also be considered.

First of these is appearance. The possible number of points awarded for appearance is the same as for perfect series of horizontal and vertical eights combined; and, although few stunt fliers would consider omitting these maneuvers from their patterns, equally few make the necessary effort to win top appearance points. The AMA rules give the requirements: the model must be well-built (a necessity anyway, if the model is to last very long), nicely-finished, and must look like an airplane.

Strength is essential too. There are few modelers indeed who do not have occasional crack-ups, but even discounting that dismal possibility, the model must still be strong enough to withstand the terrific stresses met with in contest stunt flying. This does not mean that the model must be heavy. Through stressed-skin construction (sheet balsa fuselages, planked wing leading edges), unbelievable strength can be achieved with a minimum of weight. However, all joints must be double-cemented, to withstand vibration, and all points of doubtful strength should be reinforced.

Another feature a good stunt model must have is a good airfoil. This means an airfoil with high lift, low drag, and a high stalling angle. The sections that best meet these requirements are quite thick, between 18% and 25% of the wing chord, with rather sharp leading edges. These thick airfoils actually

have less drag than the more conventional thin sections, strange as it may seem, while their lift and stalling angles are both much greater. Thick airfoils work wonders on tail surfaces too, rudders and fins as well as stabilizers and elevators. A horizontal tail with a 15% symmetrical airfoil is much more effective than the usual flat section; allowing smoother and tighter maneuvers since its stalling angle is so much greater. (Such surfaces are most conveniently built by carving them from soft solid balsa, then cutting out the center portion and inserting pieces of sheet balsa at intervals, sanding these to a rib contour, and covering the assembly with *Silkspan*.) This same idea can be equally well applied to the fin and rudder; however, instead of the customary straight fin and offset rudder, a better arrangement can be made by building the entire vertical tail as a unit, using a flat-bottomed lifting airfoil. The cambered side of the tail should be on the inside of the model's circle, and the entire assembly offset 2 or 3 deg.

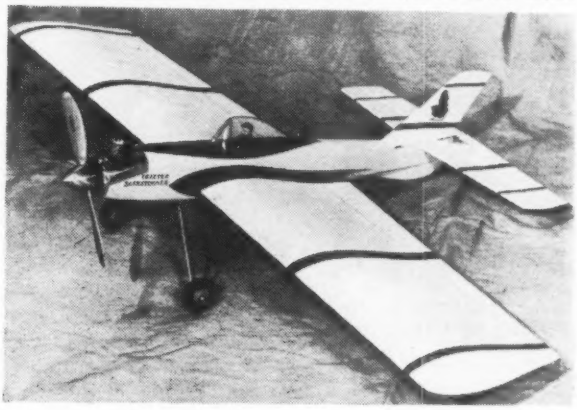
How about flaps? Well, let's put it this way: a perfectly good stunt model may be had without using flaps (witness the Senior and Open Stunt winners at the '50 *Nationals*), but performance can be bettered with them. The reason for this is that deflected flaps change the symmetrical airfoil to a lifting airfoil (the lift acting either upward or downward, depending on whether the flaps are down or up) and this lift, acting in conjunction with the elevators, permits tighter maneuvers without stalling. To be fully effective, flaps should be full-span, about 25% of the wing chord at their widest point, tapering to the tips to avoid tip-stalling the wing. Flaps should move opposite to the elevators, and their movement must never exceed 30% of the elevator movement.

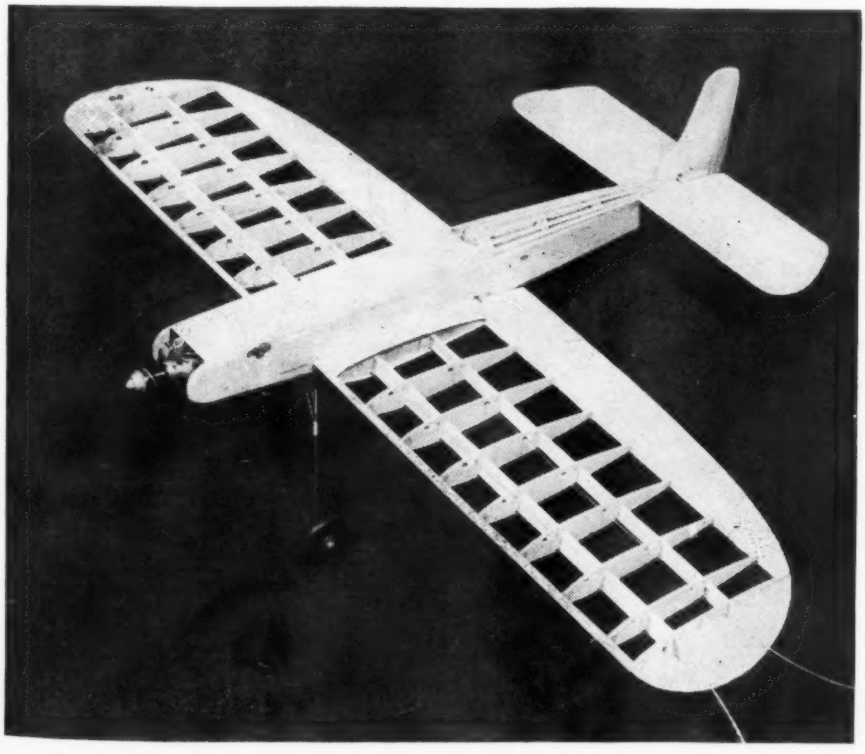
The stabilizer and elevator of a stunt model must be kept out of the turbulence behind the wing, in order to be at all effective. This usually means placing the wing as low as possible, and raising the tail as far above the wing as is practical. This is particularly true of very close-coupled models, and those with flaps.

One of the most highly misunderstood factors in stunt flying is that of power. Most of the difficulties experienced by the novice controline flier can be blamed on simply too much engine for the airplane. Excess power means excess speed, and excess speed means trouble. The reaction time of the average person is much too slow for the rapid control movements necessary to control the flight of an 80 to 100 mph stunt ship, and the terrific line pull of such an airplane only results in numbed fingers—or broken lines. Also, even if the modeler is successful in flying such a model through a stunt pattern, the

(*Turn to page* 48)

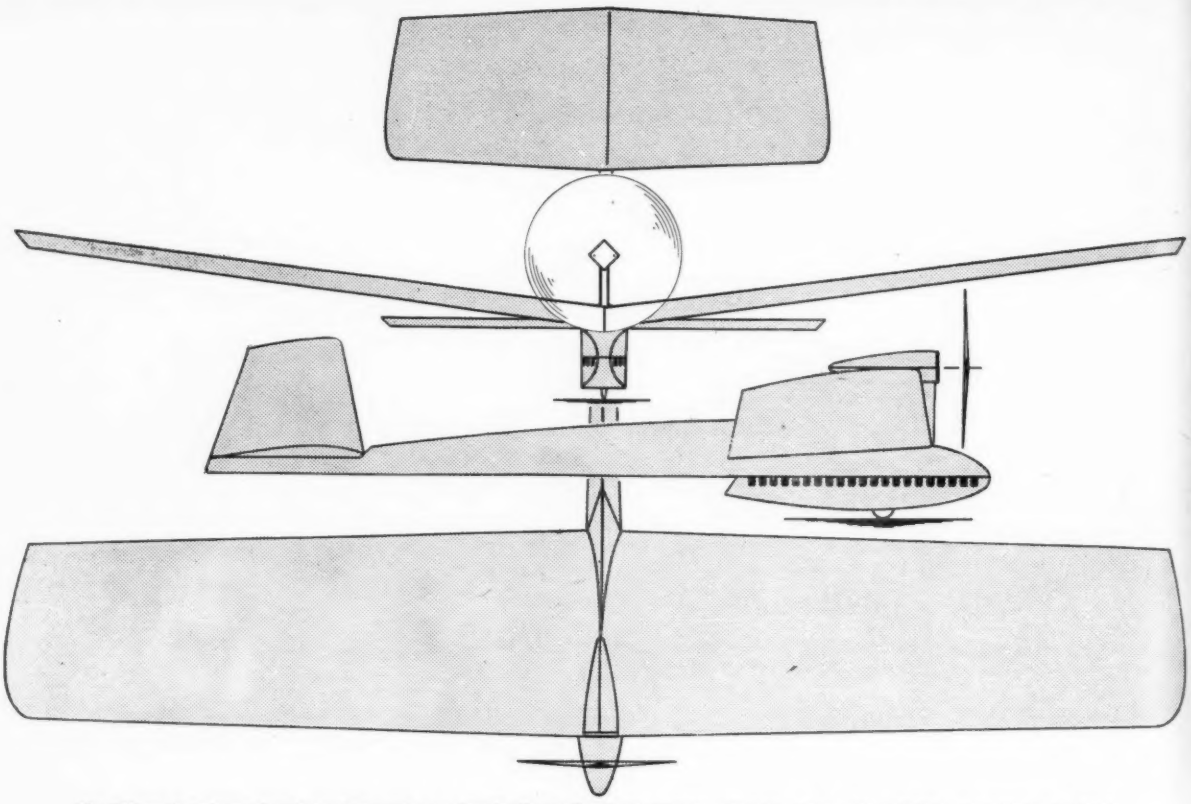
Walt Clayton's twin Torp job flys at 75mph. Its design inspired by double Mustang, it is capable of performing the full stunt pattern on one engine.





Another contender for top honors is *Trixter Barnstormer*, by Lew Andrews. Combines realism, with maneuverability. For 29's to 35's.

Left—Good stunt job must have light, simple, but sturdy construction. Careless weight additions have detrimental effect on performance.

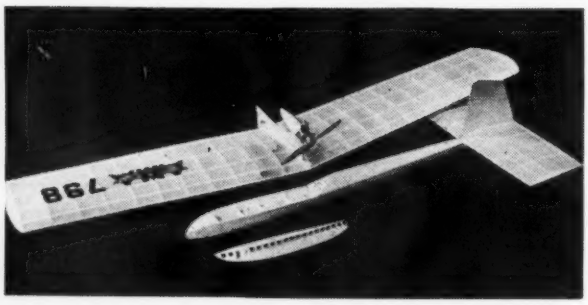


The 400 sq. in. wing and motor cabane make one knock-off unit. Pod holds weight. Weighing 5 oz. ship will lift up to 11 oz. payload.

cargo clipper

by FRANK EHLING

Pan American's new weight-lifting event for the AA engines calls for designs of an entirely new concept.



ALTHOUGH the brand new *Pan American Clipper Cargo Event* calls for AA engines, the plane itself must be completely different, not only from AA free flight proportions, but even from the new AA payload jobs. To stand any chance of winning in the Clipper Cargo division, a special weight lifting airplane that subordinates everything to toting a maximum load is imperative. To further complicate the designer's job, no one knows how much an AA engine will lift, or how big a plane these small powerplants will drag through the air. Those are general questions; it really is necessary to know the optimum or best size of plane and the amount of load that might be carried in practical manner.

It isn't easy to run a lengthy flight testing program in the winter in the east, what with snow and more or less constant winds. Fortunately, we had the use of the Jersey City Armory for indoor flights. To prevent collisions with walls and obstructions, the test airplanes were restricted to reasonable distances by attaching to the very tail a long string to which was tied a strip of rubber. Including about 25' of rubber the total tether measured about 175' in length. Towline fans will recognize this device as the reverse of "highstart," a system for launching soaring gliders. After the Clipper test ship took off, we would run behind; then, as the ship neared the end of the clear area would snub it with the string. The shock absorbing action of the rubber caused the plane to descend gently to earth with scarcely a bounce.

The first objective was to find the size of a wing that would lift maximum load and permit the ship to fly with some reserve. Several handy wings were employed. We began with one of 150 sq. in. but with a high lift section. This proved too small, both under power and in the glide, when weight was added. Evidently, a thick section does not make up for lack of area. A larger total area with a thinner section, such as a thinned down Clark Y, is more effective. Next we tried a 225 sq. in. wing from a Jr. Phoenix. While this, too, was insufficient, it did show that we were on the right track. Finally, a 450 sq. in. wing with a really thick section was tried and, surprisingly enough, the ship flew with .049 power. With really large areas that give extremely slow glide a very small addition of power is enough to make the plane climb. Since this huge wing approached the limit of the powerplant, it was decided to back off to a 400 sq. in. surface with a thinned-out section. With a 6 oz. payload—a gross load of 11 oz.—the *Cargo Clipper* proved capable of getting off in 8' in dead calm. Any kind of a breeze would quicken the take-off.

With a 6 oz. payload, *Cargo Clipper* gets off within 8' in calm air. Though K & B .049 is shown, comparable engines may be employed.

Having established the wing area and section, we turned to the configuration of the airplane. A high thrust line was decided upon to avoid prop breakage. This also permitted a shorter, hence lighter landing gear, made from thinner wire than would be needed with a more stilty gear. The short landing gear made the ground angle and angle of flight very close, which is best for take-off when low power is used. For good stability it is important that the weight be placed close to the c.g. When heavy weights are placed at distances from the c.g. inertia moments hamper stall recovery, set up forces in turns, and in any sudden maneuver.

As a matter of fact, the *Cargo Clipper* is unbalanced with the weight removed. The maximum payload this machine will lift would seem in the neighborhood of 12 oz., especially if there is a helping wind. So far a 6" x 3" pressed-wood Tornado prop serves best but the ultimate prop might have more blade area and lower pitch.

There is an important difference between the maximum payload lifting model and the typical free flight contest job. In the latter, the prop is expected to do much of the lifting, hence the angle of climb is extreme and the wing does not have to be too large. In the weight-lifting machine it is imperative that the prop should not do the lifting but that its work be transmitted into forward thrust. Another consideration is light weight. The lighter the ship the more it will be capable of lifting. The empty weight of the *Cargo Clipper* is only 5 oz. with engine. The paper covering is dyed for minimum weight. Multi-spar wings are used for greatest strength with least structural weight of the wing.

The *Cargo Clipper* has some interesting differences from the familiar payload jobs. The latter, despite their payload, could soar in a thermal and land practically in the next county. The *Cargo* ship, on the other hand, has only to remain aloft for 40 sec. and so its landings always will be in sight. Payload fans will find some unique problems have been added in the *Cargo Clipper* design. Although the ship must be light, it must also be strong enough to prevent the heavy cargo from demolishing the airplane in a rough landing. In this ship, the weight is placed in a packet to make it easy to check and to prevent the weight sliding forward in case of a crash landing. By using the cargo weight to balance the machine for trimming, it is possible to build a lighter airplane. This could be important because, in event of a tie, the lightest plane would be the winner.

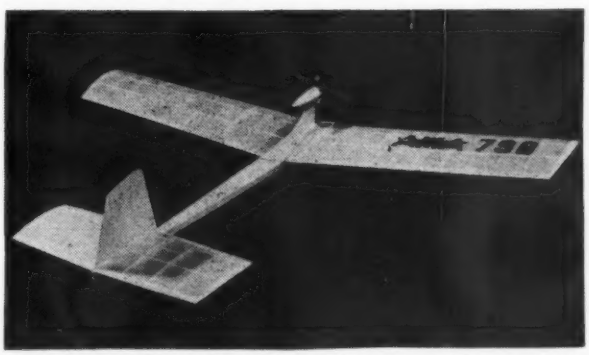
(*Turn to page* 44)

CLIPPER CARGO COMPETITION

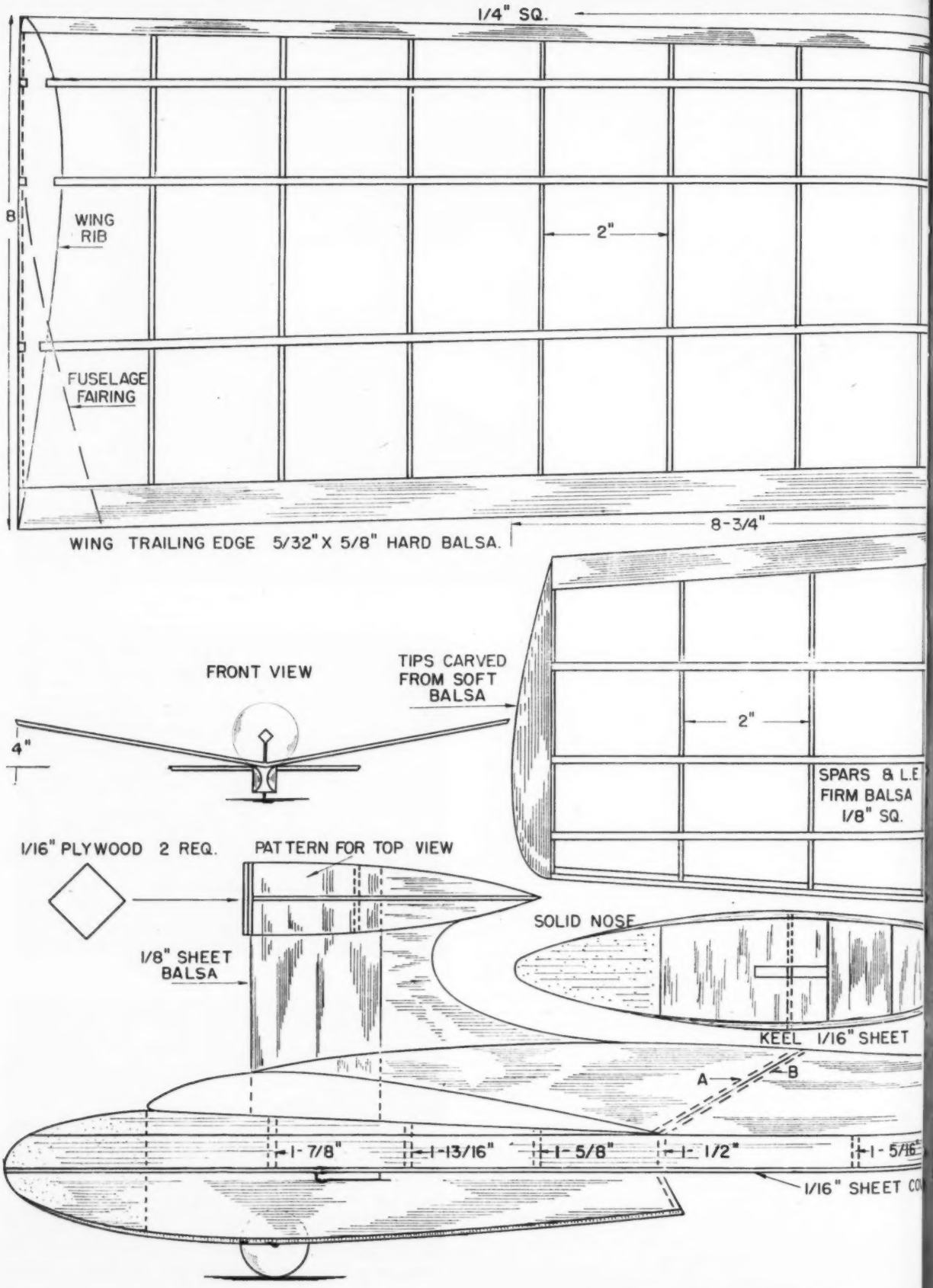
In this special event at the 1951 "Nationals", the winner will be the contestant who sends aloft the greatest amount of payload and succeeds in landing it safely.

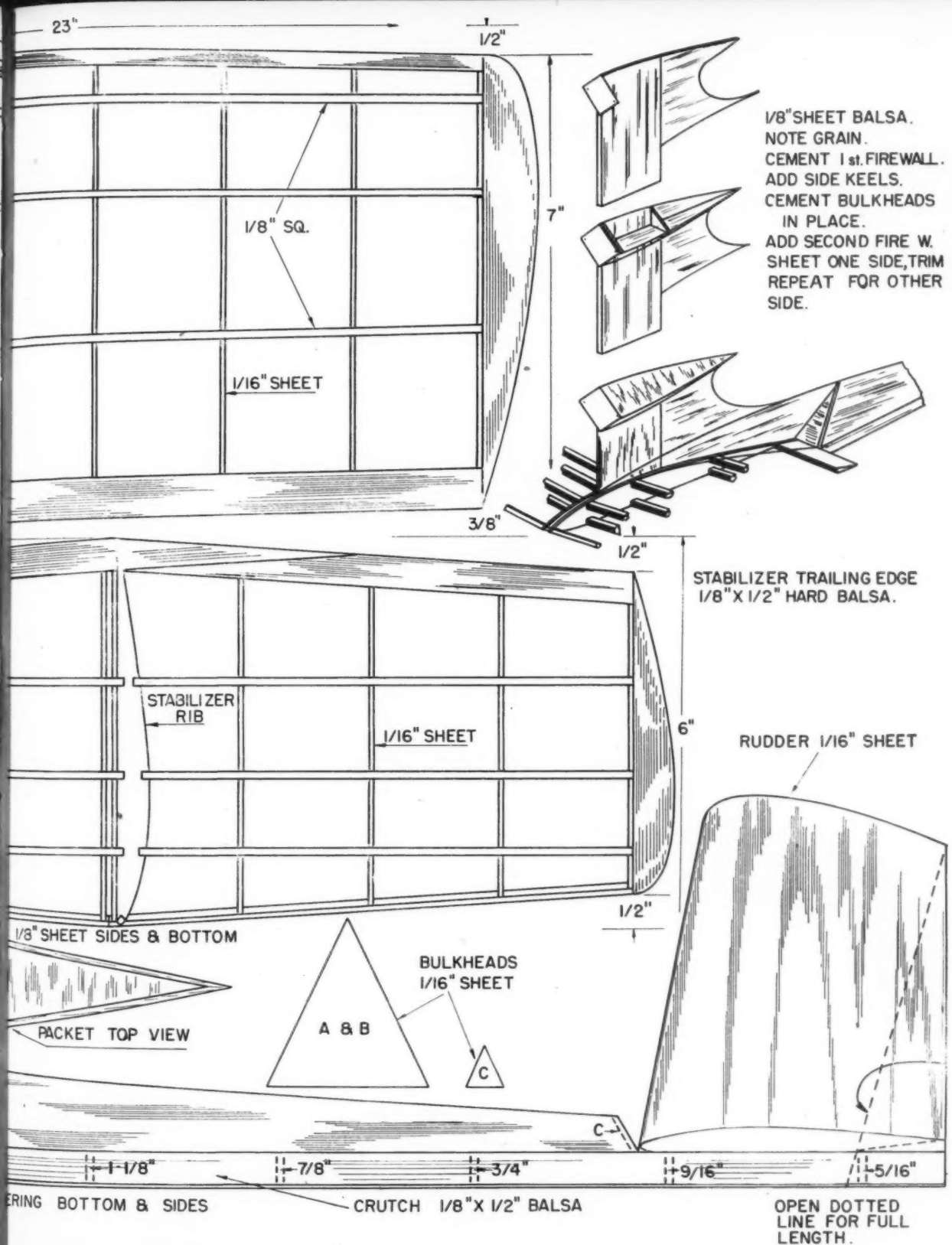
The rules:

1. Age Classification—Open to contestants of all ages.
2. Engine Classification—AA Only.
3. Official Flight—AMA rules apply. Takeoff must be R.O.G. Engine run must not exceed 20 seconds. Flight must be at least 40 seconds. Flight must conform in all respects to the AMA regulations defining official flight for AA Free Flight Models, R.O.G.
4. Character of pay load.—Material carried is at the option of contestant. (Note: Choose material which can be built up or cut down readily, as a bottle of mercury, a jar of washers or small ball bearings, etc., etc.)
5. Security of pay load.—Load must be carried inside cabin or fuselage and secured so that it will not shift during flight. *Upon conclusion of each flight which contestant wishes recorded in competition, model must be returned to registration desk by contestant, in company of timer for inspection, to prove that it landed safely with pay load.*
6. Winner. The winner is the entry carrying the greatest amount of pay load in an official flight and landing safely, with load intact. Second place goes to next largest load, and third to third largest load.



Without payload ship has phenomenal low wing loading of 1.8 oz. per sq. ft.


1/4" SQ.
8
WING RIB
2"
FUSELAGE FAIRING
8-3/4"
WING TRAILING EDGE 5/32" X 5/8" HARD BALSA.
FRONT VIEW
TIPS CARVED FROM SOFT BALSA
4"
2"
SPARS & L.E. FIRM BALSA 1/8" SQ.
1/16" PLYWOOD 2 REQ.
PATTERN FOR TOP VIEW
SOLID NOSE
1/8" SHEET BALSA
KEEL 1/16" SHEET
A
B
1-7/8"
1-13/16"
1-5/8"
1-1/2"
1-5/16"
1/16" SHEET CO



=FRANK EHLING 12/10/50=

Correct to the last turnbuckle this gorgeous Bristol fighter by E. J. Pithers, London, England, gives scale U-controllers a mark to shoot at. Powered by an Anderson *Spitfire*, its weight is 3¼ lb., the span 4' 8", and length 3' 9½". Ship was a famous two seater fighter in 1917-18.

This 11' modified *Thermic* sailplane is pride and joy of Louis Culler. Snapped by Jim Saftig near Los Angeles.

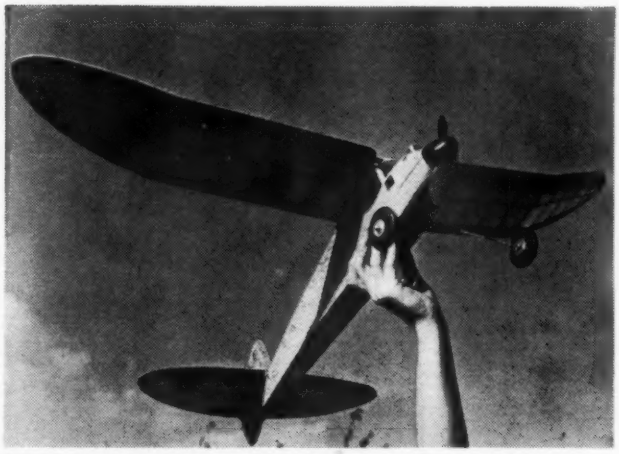
Stunt is popular in Britain, too, this *Monitor Major* kit job being a representative example. Johnny Nunn, Barking, firing up the engine prior to run at Annual Gala Fairlop. Note the side mounted, ignition engine.

Off we go into the wild blue yonder: Corking action shot catches Jim Pearce, Don Gibson, Helicats, St. Joseph, Mo.

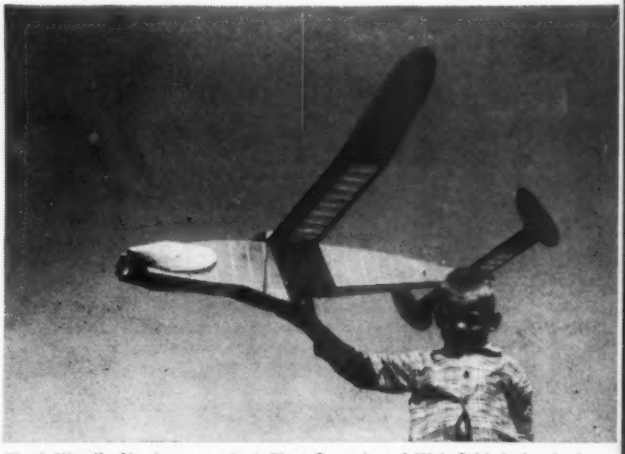
This one you can see. Nick Stasinos, student of Northrop Aero Institute, Hawthorne, Calif., built this flying saucer. It has been assigned to the Ripley's Believe It or Not Museum in New York City. It does not fly.

airways

No one need be concerned about the so-called decline in workmanship, judging by the high calibre of models selected from pictures received during the month. Poor workmanship wastes materials. The materials to build all these ships would cost upwards of $200, to say nothing of the heavy investment in time. If you, too, take pride in your handiwork, why not send a picture to Airways? These two pages are for the use of modelers everywhere.



Seen at West Essex Annual Gala, England, was this *Keil Kraft Bandit*, a 3' cabin job with realistic lines. With 1.3 cc *Mills Diesel*, it is a good flier.



Chuck Wood's Skookum, a potent Class E version of Wakefield design in January Model Airplane News, holds new national record of 23:15 rise-off-ground.

National Champion, Leslie Bartlett of San Diego and a tow liner. Competing as a junior at Dallas, Les beat out both seniors and open contestants.

Captain Bourgeois, Millington, Tenn., is experienced rc hand. This ship features ruddevator control and a Walker *slow motion* prop for power control.

official AMA news

by **RUSSELL NICHOLS**
Executive Director
A.M.A.

Ken Held Re-elected. With a much greater margin of victory than was obtained in last year's election of officers, *Ken Held* emerged as AMA President for 1951. With him as Secretary-Treasurer is *Frank B. Bushey* of Hartford, Conn., who was elected to fill that important post once more.

Supposed by many to be one important factor for Held's continued popularity is pledge to guide AMA as the members wish. This has and is being accomplished through suggestions in your letters to him at 14466 Eastburn, Detroit, Mich. Constructive criticism is always appreciated.

Besides the President and Secretary-Treasurer, elected officers include one Vice President and two Contest Board Members from each of the eleven AMA Districts. AMA Districts are set up to equalize, nearly as possible, the amount of activity in each. Following are district officers:

District I (ME., N. H., VT., MASS., R. I., & CONN.) Vice President: Charles H. Hoelck, 25 Dennison Ave., Mystic, Conn.; Contest Board: Lew Andrews, 39 Wheelock Ave., Norwood, Mass. Henry Struck, Hamburg, Conn.

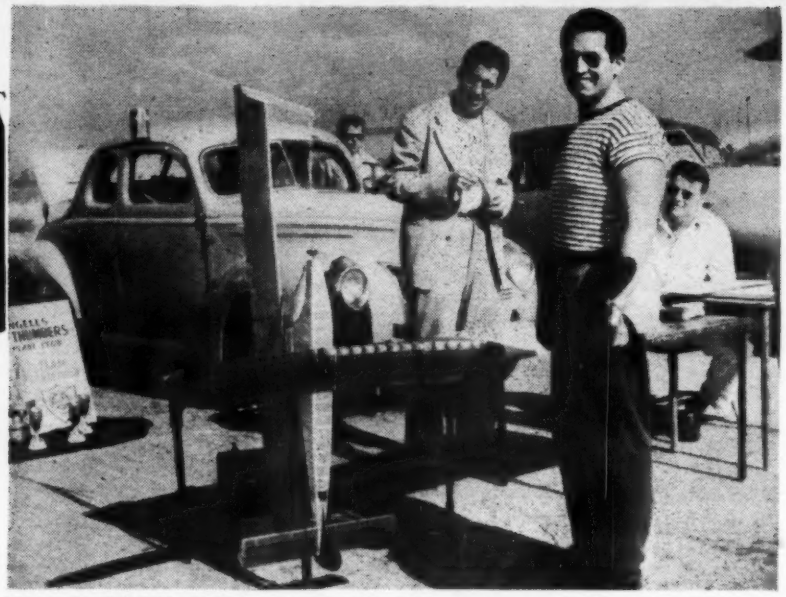
District II (N. Y. & N. J.) Vice President: E. N. Angus, 24 Ormond Ave., Oaklyn, N. J.; Contest Board: Frank Ehling, 22 Concord St., Jersey City, N. J. Fran McElwee, 1400 Kenyon Ave., So. Plainfield, N. J.

District III (PENNA., W. VA., & OHIO) Vice President: John W. Hillegas, 7804 St. Clair Ave., Cleveland, O.; Contest Board: Jack Norris, 1310 Chase Ave., Cleveland, O. Robert Housley, 231 Ninth St., N. E., Barberton, O.

District IV (DEL., MD., D. C., VA., & N. C.) Vice President: John Young, Box 691, Hagerstown, Md.; Contest Board: Wm. A. Pennoyer, 813 7th St., N. E., Washington, D. C.; James H. Ripkin, 3305 Richmond Ave., Baltimore, Md.

District V (S. C., GA., FLA., ALA., MISS., & TENN.) Vice President: Lewis A. Chambers, 3011-D Lake Park Dr., Marietta, Ga.; Contest Board: Albert T. Hall, Jr., NAAS, Corry Field, Pensacola, Fla.; W. T. Thomas, 105 N. Halifax Ave., Daytona Beach, Fla.

(*Turn to page* 52)



Bill Lopez's Wakefield weighs in on unique scale at *Los Angeles Thermal Thumbers* contest. Note fuel can counterweight on arm. Club well-known for contest promotion. Andy Peterson looks on.

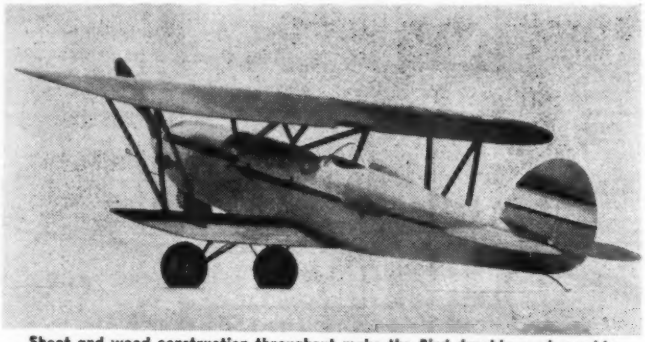
Ed Bellin and mother, with Bill Clifford and Jim Nightingale, Phoenix, Arizona, at a *Plymouth Internationals* in Detroit. The 1951 Internationals announced week of August 20 through 27.

Toilers in the sun are the unthanked helpers who do the processing while the rest are flying. Lawrence Conover weighs in at Iowa City, Iowa. And the processor? He is anonymous, as always.

This AA controline version of one of history's great airplanes has everything. The lengthened landing gear is the sole departure from true scale.

the amazing BIRD

by H. A. THOMAS



Sheet and wood construction throughout make the *Bird* durable, and provide a good foundation for color doping. Light weight assures top performance.

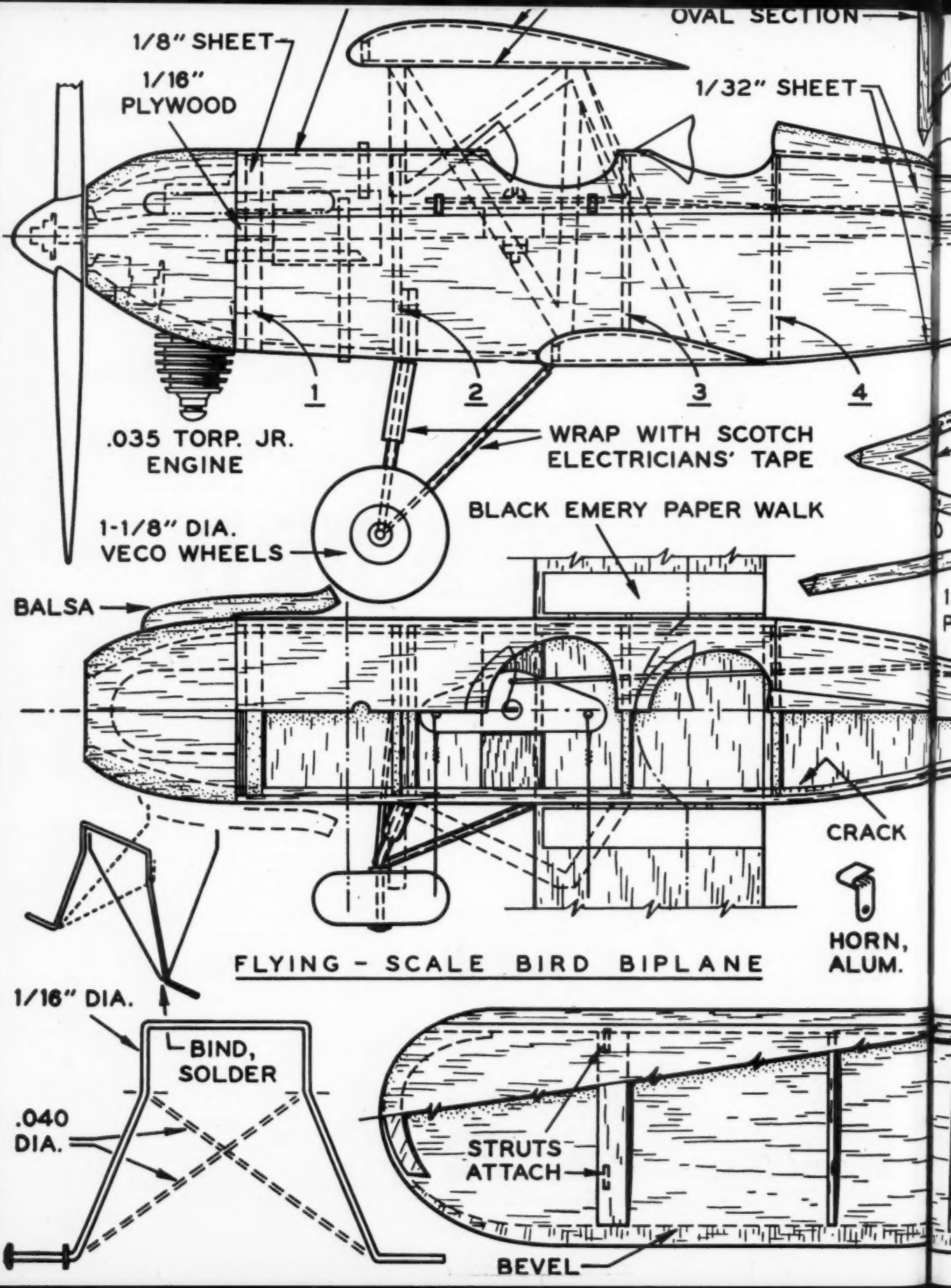
Generous wing area of the real plane is noticeable here. In comparative tests the real *Bird* took off and outclimbed an autogyro. Lines up to 40".

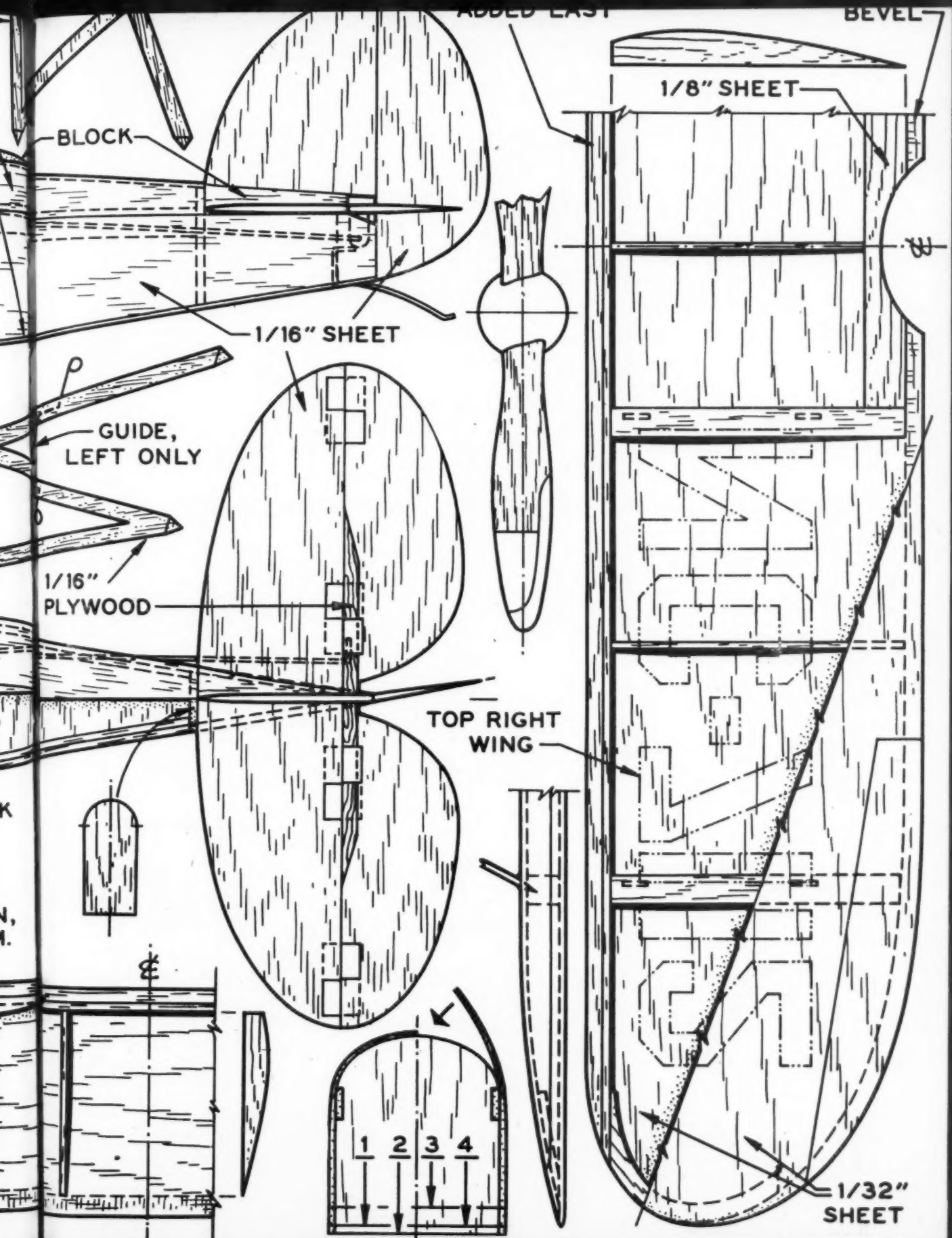
BACK in the '30s, a familiar private sport and training plane was the Brunner-Winkle *Bird* biplane. Similar to contemporary Wacos and Travelaires and powered by *OX, Kinner, Wright, Jacobs* and *Warner* engines, the *Bird* was a three-place open job of pleasing lines and noteworthy performance. Exceptional take-off and climbing abilities of the 125 hp *Kinner* version were demonstrated in exhibitions when it outclimbed a 300 hp autogyro of the period.

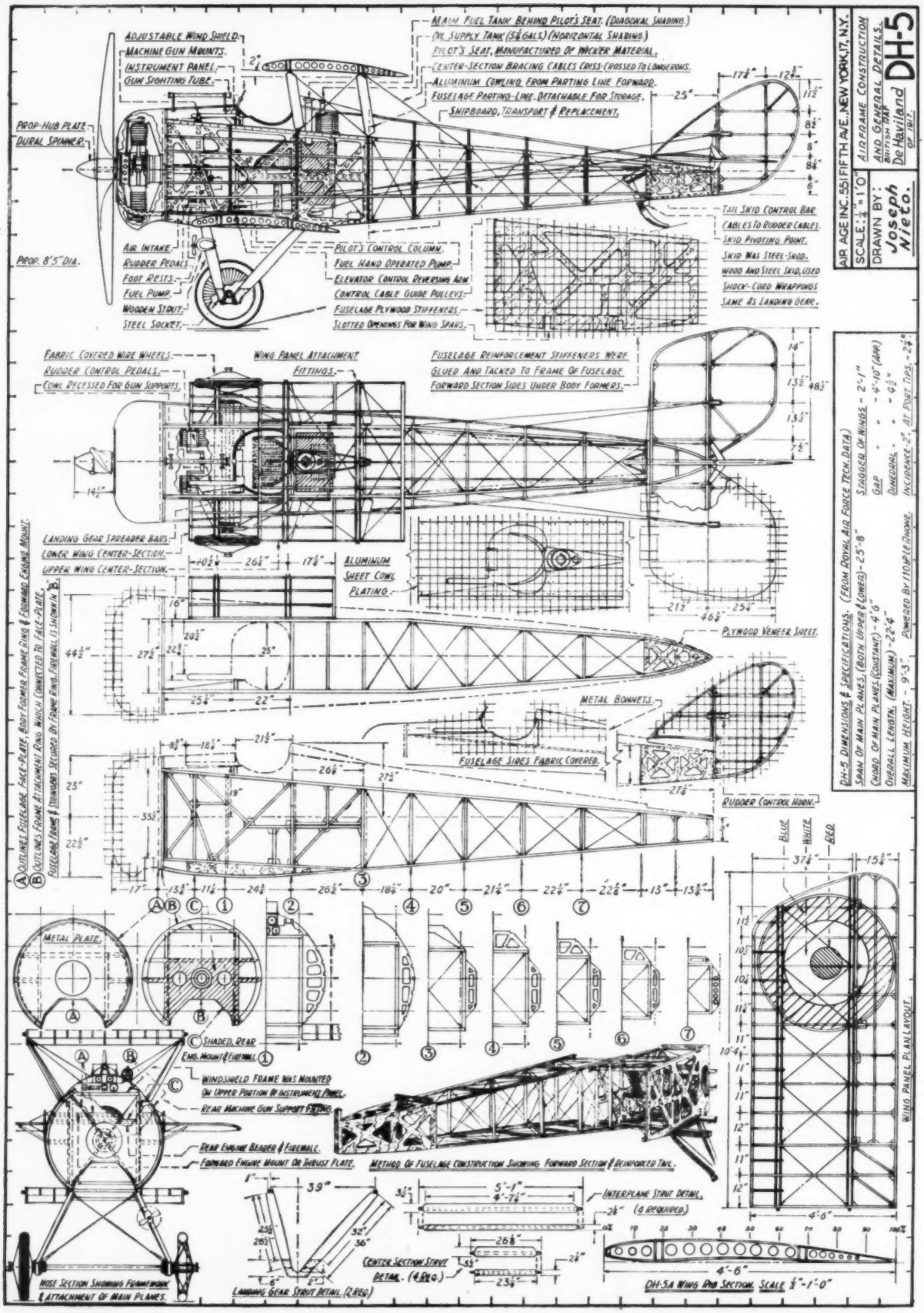
Because of trim nose lines, which lend themselves admirably to installation of an inverted engine, we have selected the original model *Bird* with the Curtiss *OX-5* 90 hp engine as prototype for our model. The plans are near true scale with the gear being only slightly extended for propeller clearance. The inverted *Torp Jr.* cylinder (*OK .039* came on the market after the *Bird* model was designed—Editor) protrudes through the radiator opening in a most unobtrusive way considering the model's small size. For installation of other AA engines the firewall former can be moved to compensate for variations in crankcase length.

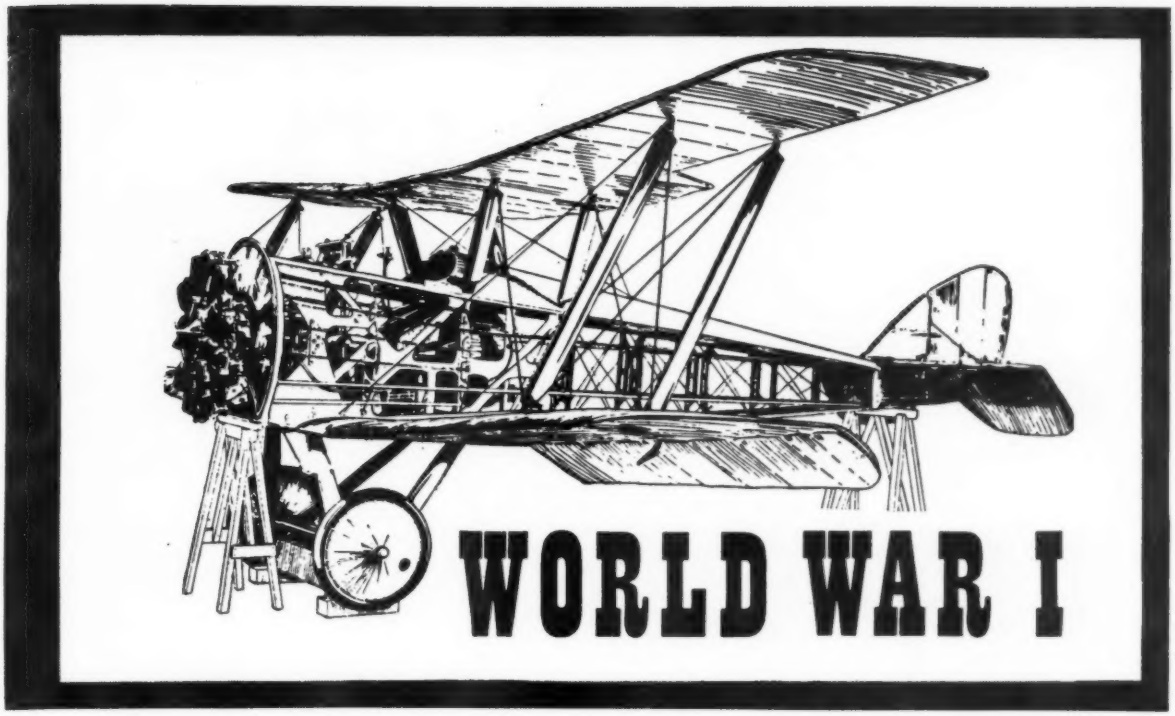
The real *Bird's* wings were somewhat on the thick side, so we employ sheet wing surfaces with light structure inside, particularly at strut attachment points. Using soft material, assembly is begun with the lower flat surfaces, on which the ribs and inner leading edge strips are cemented. After sanding the trailing edges to a slight bevel, fit the upper sheets in place, cementing and pinning them except at the tips. Moisten the tip lower surfaces to facilitate bending them upward in the characteristic *Bird* style. Use pins and small pieces of masking tape to hold the edges together. Finally, cement the leading edge strips in place. Shaping is done with a sharp knife and sanding block. The completed wings are to scale in every respect and are vastly lighter than solid ones

(*Turn to page* 51)


OVAL SECTION
1/8" SHEET
1/16" PLYWOOD
1/32" SHEET
1
2
3
4
.035 TORP. JR. ENGINE
WRAP WITH SCOTCH ELECTRICIANS' TAPE
BLACK EMERY PAPER WALK
1-1/8" DIA. VECO WHEELS
BALSA
CRACK
HORN, ALUM.
FLYING - SCALE BIRD BIPLANE
1/16" DIA.
BIND, SOLDER
.040 DIA.
STRUTS ATTACH
BEVEL


BLOCK
1/16" SHEET
GUIDE, LEFT ONLY
1/16" PLYWOOD
TOP RIGHT WING
1/8" SHEET
BEVEL
1/32" SHEET
1 2 3 4

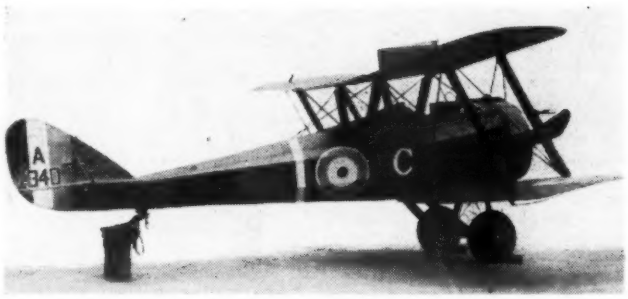

AIR AGE INC. 551 FIFTH AVE. NEW YORK, 17, N.Y.
SCALE: ¼"=1'0"
DRAWN BY: Joseph Nieto.
AIRFRAME CONSTRUCTION AND GENERAL DETAILS OF THE De Haviland DH-5 OF 1917.
MAIN FUEL TANK BEHIND PILOT'S SEAT. (DIAGONAL SHADING.)
OIL SUPPLY TANK (5½ GALS.) (HORIZONTAL SHADING.)
PILOT'S SEAT, MANUFACTURED OF WICKER MATERIAL.
CENTER-SECTION BRACING CABLES CRISS-CROSSED TO LONGERONS.
ALUMINIUM COWLING FROM PARTING LINE FORWARD.
FUSELAGE PARTING-LINE, DETACHABLE FOR STOWAGE, SHIPBOARD, TRANSPORT & REPLACEMENT.
ADJUSTABLE WIND SHIELD.
MACHINE GUN MOUNTS.
INSTRUMENT PANEL.
GUN SIGHTING TUBE.
PROP-HUB PLATE.
DURAL SPINNER.
PROP. 8'5" DIA.
AIR INTAKE.
RUDDER PEDALS.
FOOT RESTS.
FUEL PUMP.
WOODEN STRUT.
STEEL SOCKET.
PILOT'S CONTROL COLUMN.
FUEL HAND OPERATED PUMP.
ELEVATOR CONTROL REVERSING ARM.
CONTROL CABLE GUIDE PULLEYS.
FUSELAGE PLYWOOD STIFFENERS.
SLOTTED OPENINGS FOR WING SPARS.
TAIL SKID CONTROL BAR.
CABLES TO RUDDER CABLES.
SKID PIVOTING POINT.
SKID WAS STEEL-SHOD. WOOD AND STEEL SKID, USED SHOCK-CORD WRAPPINGS SAME AS LANDING GEAR.
FABRIC COVERED WIRE WHEELS.
RUDDER CONTROL PEDALS.
COWL RECESSED FOR GUN SUPPORTS.
WING PANEL ATTACHMENT FITTINGS.
FUSELAGE REINFORCEMENT STIFFENERS WERE GLUED AND TACKED TO FRAME OF FUSELAGE FORWARD SECTION SIDES UNDER BODY FORMERS.
LANDING GEAR SPREADER BARS.
LOWER WING CENTER-SECTION.
UPPER WING CENTER-SECTION.
ALUMINIUM SHEET COWL PLATING.
PLYWOOD VENEER SHEET.
METAL BONNETS.
FUSELAGE SIDES FABRIC COVERED.
RUDDER CONTROL HORN.
A OUTLINES FUSELAGE FACE-PLATE, BODY FORMER, FRAME RING & FORWARD ENGINE MOUNT.
B OUTLINES FRAME ATTACHMENT RING WHICH CONNECTED TO FACE-PLATE.
FUSELAGE FRAME & TURNBUCKLES SECURED BY FRAME RING. FIREWALL IS SHOWN IN C.
DH-5 DIMENSIONS & SPECIFICATIONS. (FROM ROYAL AIR FORCE TECH. DATA)
SPAN OF MAIN PLANES. (BOTH UPPER & LOWER) - 25'-8"
CHORD OF MAIN PLANES (CONSTANT) - 4'-6"
OVERALL LENGTH, (MAXIMUM) - 22'-4"
MAXIMUM HEIGHT - 9'-3"
STAGGER OF WINGS - 2'-1"
GAP " " - 4'-10" (APX.)
DIHEDRAL " " - 4½°
INCIDENCE - 2° AT BOOT TOPS - 2½°
POWERED BY 110 P.P.H. PHOENIX.
METAL PLATE.
SHADED, REAR ENG. MOUNT & FIREWALL (1)
WINDSHIELD FRAME WAS MOUNTED ON UPPER PORTION OF INSTRUMENT PANEL.
REAR MACHINE GUN SUPPORT FITTING.
REAR ENGINE BEARER & FIREWALL.
FORWARD ENGINE MOUNT OR THRUST PLATE.
NOSE SECTION SHOWING FRAMEWORK & ATTACHMENT OF MAIN PLANES.
METHOD OF FUSELAGE CONSTRUCTION SHOWING FORWARD SECTION & REINFORCED TAIL.
LANDING GEAR STRUT DETAIL (2 REQ.)
CENTER SECTION STRUT DETAIL. (4 REQ.)
INTERPLANE STRUT DETAIL. (4 REQUIRED)
BLUE
WHITE
RED
WING PANEL PLAN LAYOUT.
DH-5A WING RIB SECTION. SCALE ½"=1'-0"



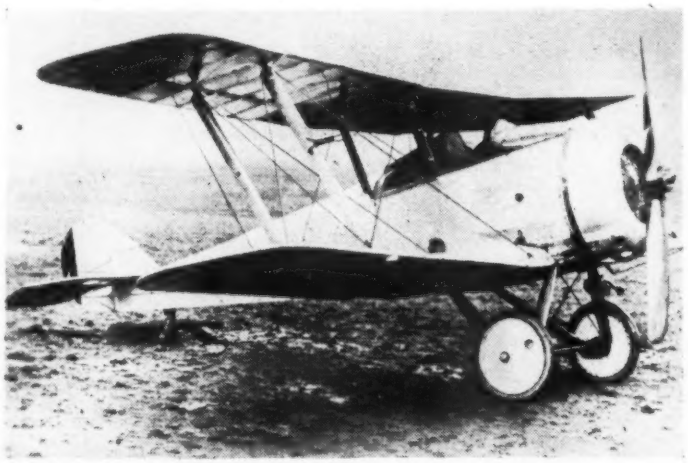
WORLD WAR I

D.H.5 Part Two

by ROBERT C. HARE



Jaunty back-staggered DH-5 was the sixth highest production single-seat fighter of the first big war. A single fixed .303 gun fired through prop.



DURING 1917, the *D.H.5* was issued to a number of British Squadrons, the pilots of which found that the little back-staggered fighter was a pretty fair pursuit machine. Accepted at first almost as an interim fighter—before some of the more promising types arrived in numbers—the *D.H.5* soon became a highly respected weapon both from the British and German standpoints.

Total production of the *D.H.5* amounted to 483 complete airframes, plus spares, making it the sixth highest production single seat fighter producted for the Royal Air Force during World War I. How many of these were actually constructed in the shops of Aircraft Manufacturing Company is not known, but at least one other constructor produced the type under license.

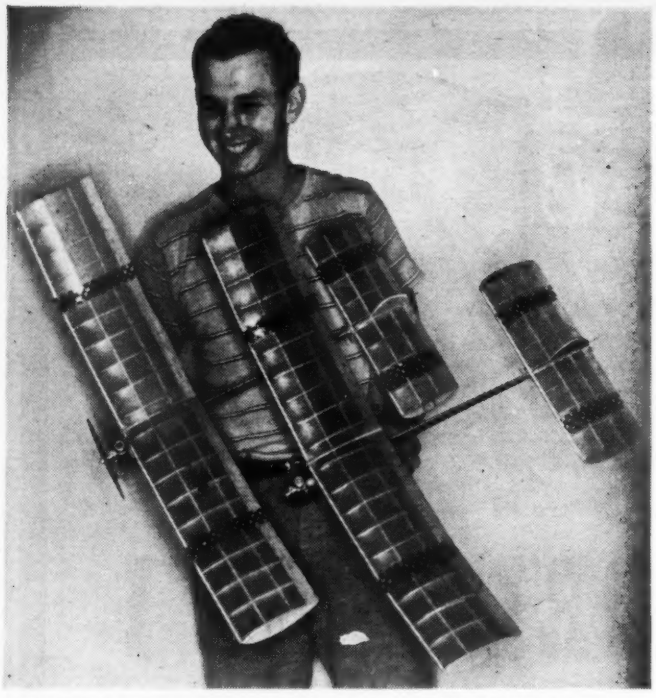
This of course cleared Airco's shops for development of other de Havilland designs, notably the *D.H.6* and *D.H.9*, which were under development at the time.

Structural simplicity was a factor in getting the *D.H.5* to the Front quickly.

Fuselage Construction. Basically a typical four longeron structure, the *D.H.5* fuselage nevertheless displayed many design innovations that made Geoffrey de Havilland a top man in his field. Because de Havilland was an advocate of large plywood webs and panels as a means of obtaining lightness with strength and rigidity, the *D.H.5* fuselage was broken down into two sections—one in which plywood played a dominant function, the other where more conventional structure was used.

The forward fuselage section was a separate unit running from the firewall back to the point where the rear interplane struts were attached. This section was composed of four longerons, the usual uprights and cross-braces, but the sides were reinforced by large plywood panels 3 mm. thick and cut out to provide the necessary stiffness. A low-backed wicker seat was located about in the middle of the section to accommodate the pilot and engine attachment fittings were located in the extreme front. Spars of the

(*Turn to page* 46)



End product of years of experimentation, these two .049 jobs indicate the extreme simplicity of design, coupled with what it takes for top performance.

the half shot

by H. T. WILLIAMSON

THE Half Shot Series as presented here is the result of many years of experimentation with pylon-type free flight models. We have increased and decreased wing loadings, changed tail moment arms and stab areas and used innumerable airfoil types, with the conventional design shown as the net result of our labors. The only unusual feature is the type of fuselage construction utilized, our answer to the strength and construction-ease, requisite in a contest model.

If you are moderately lazy, as we are, the *Half-Shot* is a good bet—providing a maximum of flying fun for an absolute minimum of effort.

A glance at the detailed drawings will show two scale rulers. By using the one marked .049 and enlarging the grids to 1/4" you can lay out the .049 version. For those modelers who prefer something for an .099 engine, another scale ruler is presented and suitably noted on the drawing. In addition, there is a three-view sketch, giving the more ambitious a chance to build their version in a 19 size.

The following construction notes are for the .049 and .099 versions with a few special notes at the end for the .199 boys.

Fuselage. From medium-hard quarter grain sheet stock, cut three fuselage outlines. Spread a thin coat of cement on both sides of the center ply and the same on one side only, of the outside plys and allow to dry, then repeat the process and place them together. Work out the excess glue by sliding the sheets in a circular motion until you have a wood-to-wood contact at all points. A slower-drying cement, such as *Ambroid* works best, for this type of job. Place the assembly under the heaviest object you can lift. We use a chunk of steel rail and it works like a charm. Cut out all the pieces for the pylon from the same stock as used for the fuselage, paying strict attention to the grain-direction and cement them together in the same manner as the fuselage. While these parts are drying, preferably 12 hours or even overnight, cut out the firewall and the wing rest, stab rest and all the ribs required. After the required drying time has elapsed, sand the pylon and fuselage joint and cement them together. Now add the 1/8" plywood firewall, with nuts well-cemented to the rear and the 1/8" square balsa firewall braces. The cheeks are roughly carved from soft balsa blocks and then lightly cemented in place, so they may be removed later. The fuselage is now shaped and sanded very smoothly, and the cheeks brought down to their correct size and given a similar finish. At this point, remove the cheeks and hollow-out to the correct wall-thickness as shown on the drawings. The fuselage is now given two coats of clear dope, sanding well between coats and wet-covered with heavy silkspan or silk. Failure to do this will probably result in an inferior fuselage, that will not stand the punishment it was designed for. The cheeks are permanently cemented in place at this point and covered with narrow strips of the same material as used in the fuselage. Two-coats of thinned dope applied over the covering will result in a smooth, expert-like finish.

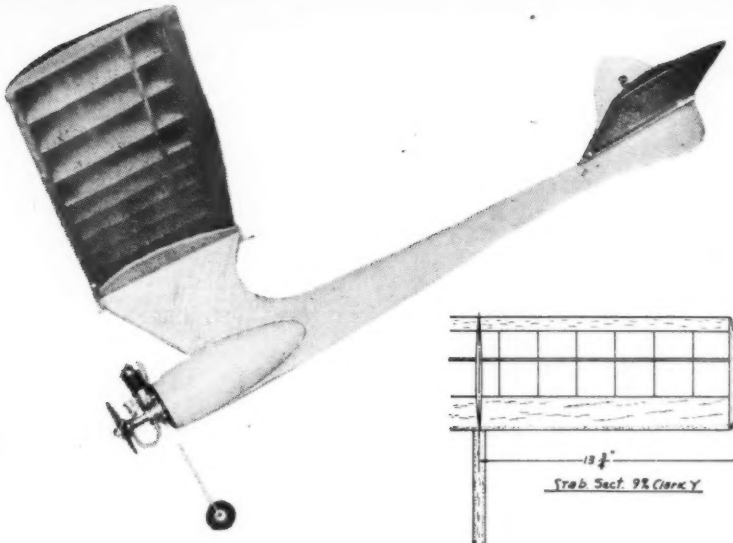
Wing. After selecting the proper size, medium-hard wood for the leading and trailing edges, pin them in position on your wax paper-protected plans and cement all ribs in place, except for the one in the very center of the wing. Double cement all joints and allow the assembly to dry. Now, crack the leading and trailing edges at the polyhedral joints and in the center, raise each panel to the correct height as shown on the drawing and hold them in position with blocks placed on the work bench and add the center rib. Cut 12 gussets from 3/32" sheet stock and cement them in place at each break, and at the same time form a smooth, cement film over each break in the leading and trailing edge. Select your spars from the proper size hard balsa, and trim the ends as shown and cement the top spar in place. After drying, remove the wing from the board and add the lower spar. The leading edge is now sheeted with 1/32" soft balsa, the tips are carved from soft blocks. The sheet leading edge may be omitted if desired (don't forget to change the ribs before you cut them out), but it does provide strength and improve flight characteristics.

After giving the wing assembly sufficient drying time, a good sanding job is in order, paying particular attention to the removal of all excess glue and rough spots where the ribs join the sheeted leading edge and trailing edge notches. When the sanding job is completed, give the leading and trailing edges a coat of clear dope on both sides and again sand lightly. The wing is covered with dyed tissue and given 5 coats of thinned, clear dope.

Now that your wing is completed lay it upside down on the bench and cover the center section with wax paper. Take the parts you have cut out for the wing rest and cement together on the wax paper protected wing center, making certain they follow the curvature of the under camber.

Tail Group. The stabilizer is constructed in a manner similar to that used on the wing. Don't forget to allow sufficient room between the center ribs to permit the rudder to slip between them. Cover the stab with tissue and give it five coats of thinned dope. The rudder is cut from medium hard sheet balsa of correct size, with the grain running vertically and give one coat of sanding sealer. Sand well and slip between the center ribs of the stabilizer and liberally cement in place.

To finish the construction, the wing rest and stabilizer platform are cemented in place. These two parts usually take a great deal of punishment; therefore, take the time to make the



Left—Laminated sheet fuse and hollow block cheeks, easiest way to make small free flights. Cover body with paper, silk.

This free flight has everything. Full-size plans for small engines, sizes for .09's, info for .199's

joints strong by forming a smooth fillet of cement between these parts and the fuselage. Before the ship is complete, the wing hold-down wires are inserted and glued in the pylon and the 1/16" dowel and dethermalizer added to the rudder and fuselage.

Finishing. A light, easily-seen and colorful finish is a necessary part of any free-flight model in our opinion, and is well worth the extra few minutes spent on the job. The original ships have a red fuelage, with yellow wing and stab and a red rudder. All trimming was done with Hobby Decal *Checkerboard* on the wing and stab with *Trim Film* stripes, producing a neat, colorful and distinctive appearance.

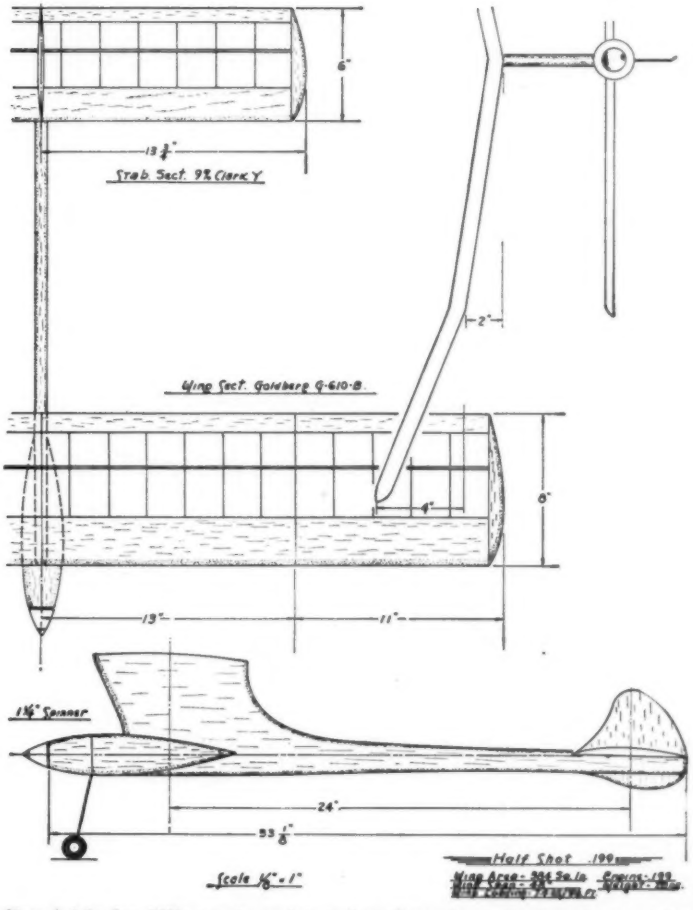
Before we get to the flight adjustments, a word about the .199 version may be in order.

The 3-view sketch gives the outlines of this ship and the overall dimensions. The wing and stab are constructed in a manner similar to the .049 and .099 models, but the fuselage, due to its size, deviates from the laminated-profile style of these two ships.

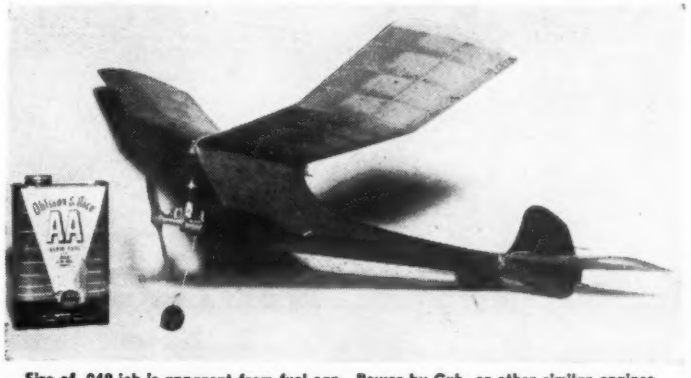
The .199 prototype fuselage employs a built-up center frame using 1/8" x 3/8" longerons and uprights with 1/8" soft sheet covering on each side. To date, it has proved exceptionally strong, with the desired low-drag characteristics featured in this design. An angular difference of 1-1/2° incidence between the rudder and stab gives this ship a flight style which parallels that of the smaller ships. The addition of cowl and spinner as shown on the sketch, greatly adds to the appearance and certainly, reduces the drag.

Adjusting and Flying. Before making the preliminary glide tests, the wing and stabilizer must be keyed in position by cementing pieces of 1/8" dowel, split in half, to both sides of the rudder and stab, at the leading and trailing edges. At the same time, check these surfaces for warps and make certain they are in alignment. Find a nice open chunk of real estate and begin your glide tests by launching the model gently from an overhead position, into the wind. The glide should be worked on until it is flat with just a hint of a stall. Now shim up the right side of the stabilizer (viewed from the front)

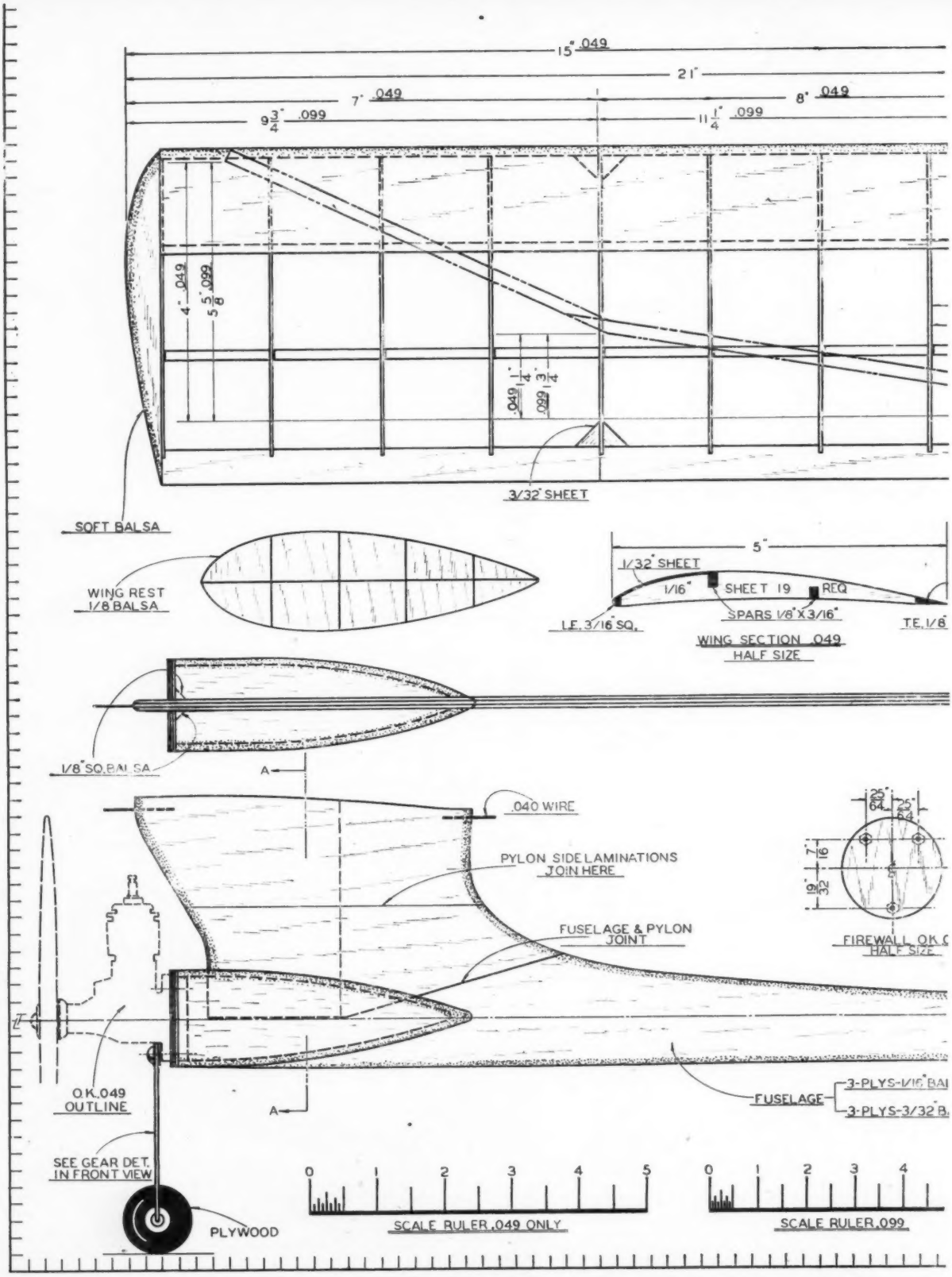
(*Turn to page* 45)



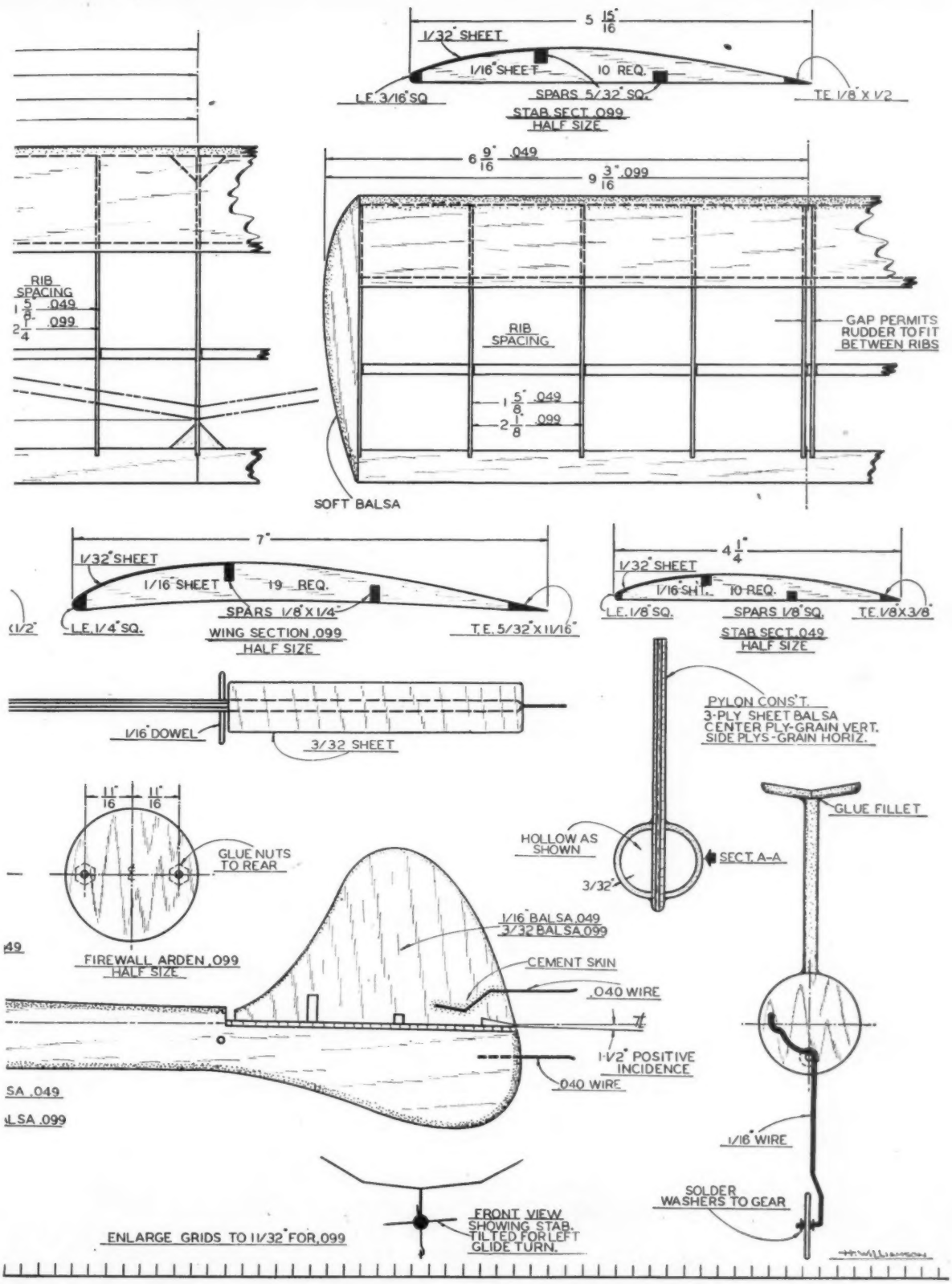
Class A jobs for .199's may be scaled up from three views. Fuselage, however, has built-up center frame, sheet covering. The 384 sq. in. area is excellent all round size.



Size of .049 job is apparent from fuel can. Power by Cub, or other similar engines. Author's original model won or placed in every contest, except on one lost flight.



An outstanding example of pylon design, the Half-Shot has the near-perfect combination of



power and glider performance for three sizes of engines. You can win trophies with it this season!

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Q1—CESSNA 170
Wing Span 15 in.

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Wing Span 15 in.

Q3—TAYLORCRAFT
Wing Span 15 in.

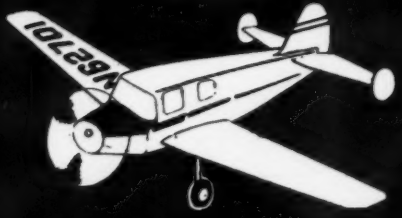
Q4—PIPER CUB
Wing Span 15 in.

Q5—BEECHCRAFT BONANZA
Wing Span 13 in.

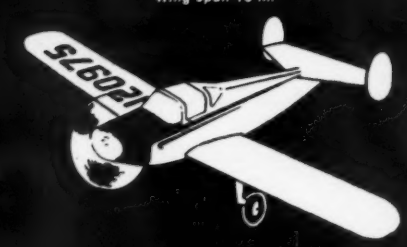
Q6—AERONCA
Wing Span 15 in.

25¢

Q8—BELLANCA CRUISEMASTER
Wing Span 13 in.

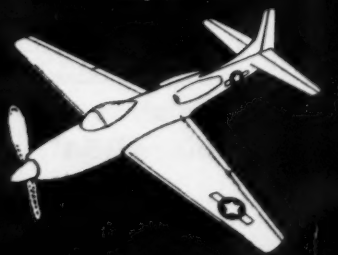


Q9—ERCOUPE
Wing Span 13 in.

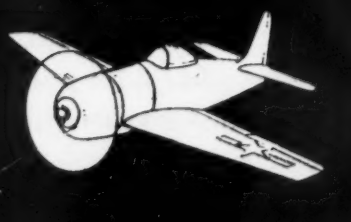


Q7—LUSCOMBE SEDAN
Wing Span 15 in.

Q11—CONSOLIDATED XP81
Wing Span 13 in.



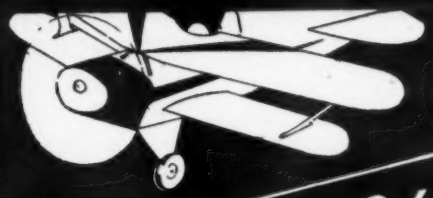
Q12—GRUMMAN BEARCAT
Wing Span 13 in.



Q10—HAWKER TEMPEST
Wing Span 13 in

● **Pre-Fab models with all parts finished and notched! A cinch to assemble quick-as-a-flash!**

● **Every Airlane model ROG'S (rises off ground) under its own power! That's *really* flying!**



50¢

In the 50c group you get everything in the 25c group complete with these extras:

- Die cut colored plastic cowling and striping.
- Windshield of clear plastic-cut out and finished.
- Numerals are die cut with glued back . . . apply water to stick on.

R1—TAYLORCRAFT
Wing Span 21 in.

D1—LUSCOMBE SEDAN
Wing Span 25½ in.

$1.25

LUSCOMBE SEDAN *GAS MODEL*

LOOK WHAT YOU GET:

A pre-fab with all balsa parts die-cut and notched for ease of assembly. U control model . . . flying scale and stunt. For class 1 2A motors up to and including .049. Worth twice the price!

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Best for hot fuel proofing. 2 oz.

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"AIRLANE All Purpose"

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- Extra Strong
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"Airlane" is made from the old, reliable and original formula that has proved itself best! Never dries or hardens in the tube. Best for ALL jobs. It is flexible and goes further! Ideal for HOUSEHOLD USE, too!

"AIRLANE" FUEL PROOF CEMENT

The most important . . . most needed item for the gas model builder! It is impervious to hot fuels; dries extra quick; holds tight and gives fastest on-the-spot field repairs. 2-oz. tube.

25c

Look at the VALUE in Every 25c Box

- Attractive two-color plan with stripes, cowling and insignia in bright colors.
- All balsa parts notched for easy assembling.
- Dihedral and camber automatically formed by method of construction.
- Finished wire landing gear.
- Smoothly finished colored plastic propeller.
- Finished hardwood wheels.
- Thrust button • Rubber motor • Prop shaft

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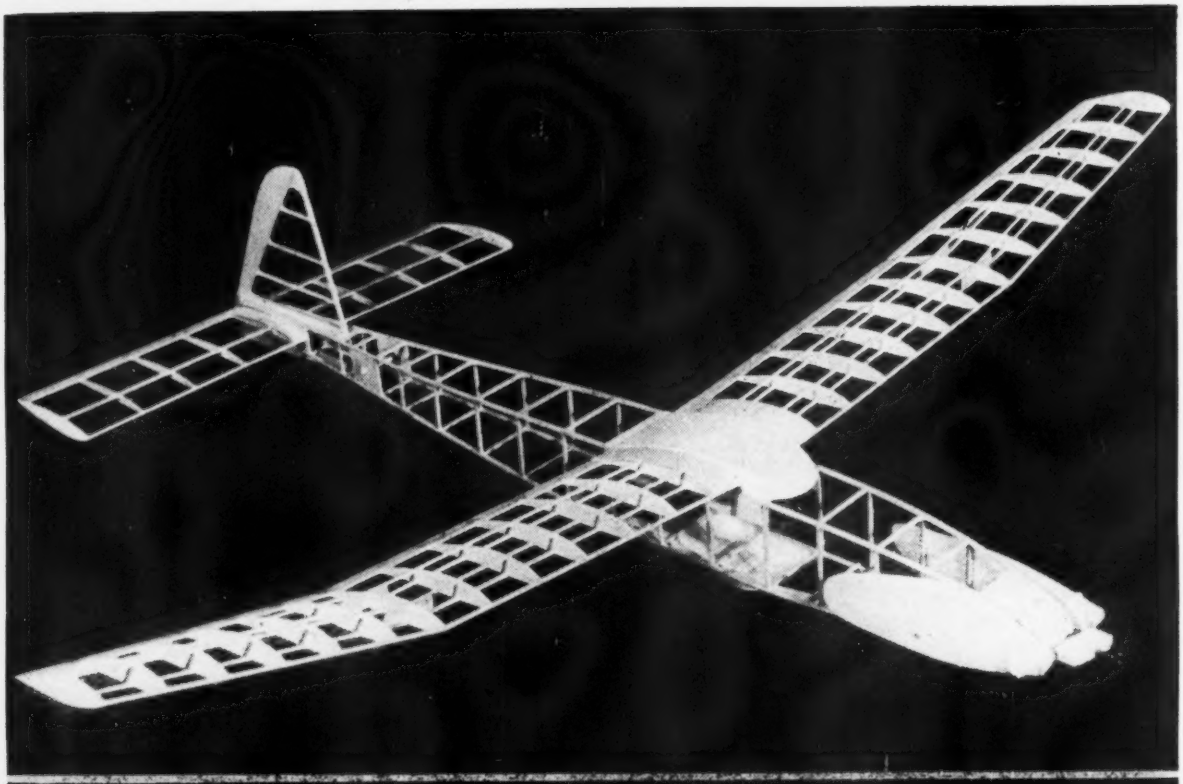
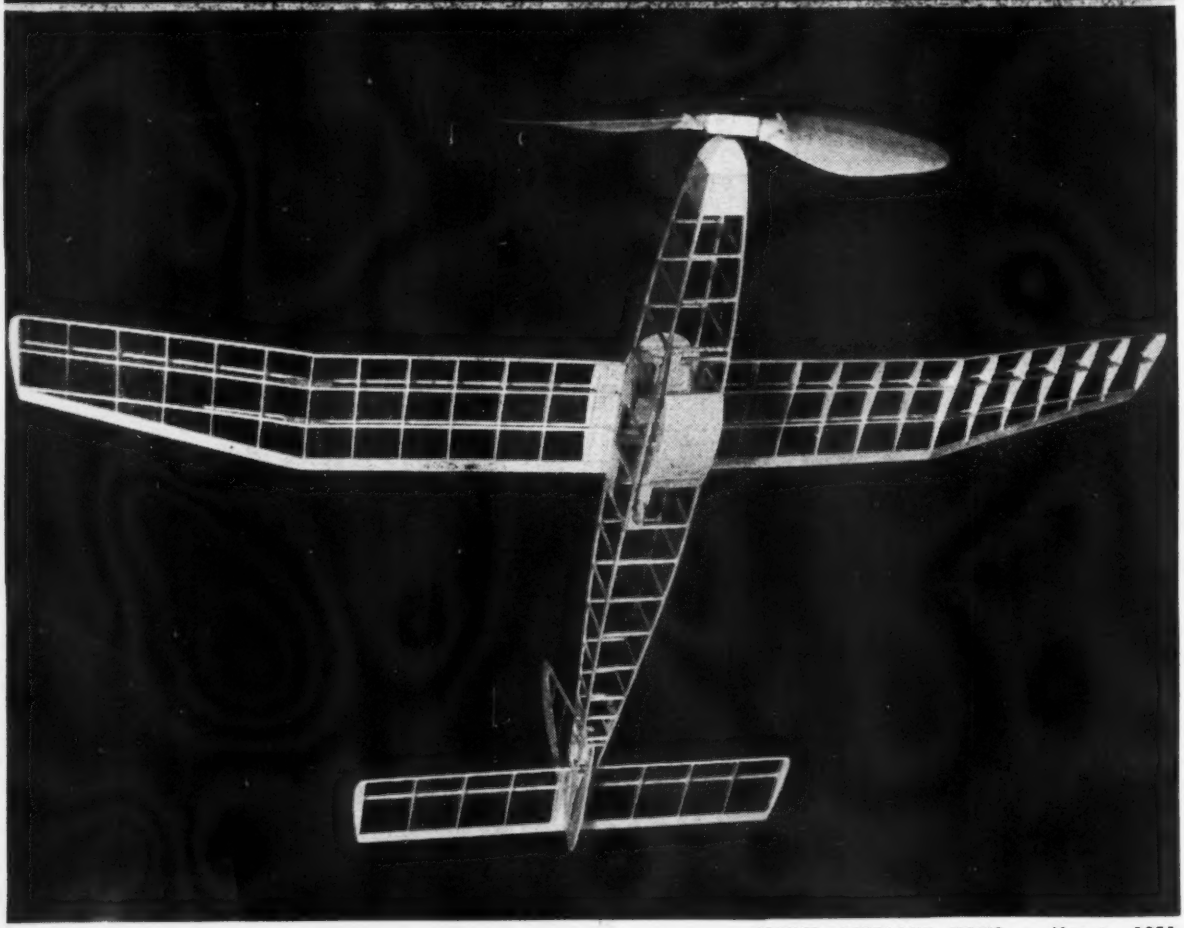
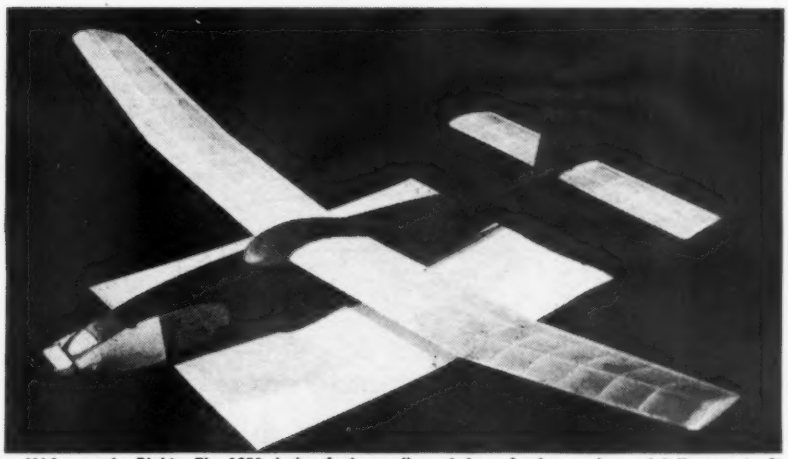




A WAKEFIELD DESIGN FOR THE 1951 RULES



Left—The author with the 1950 model which held the *AMA* record. Right—The 1951 design features slimmed down fuselage, wing and tail areas to fit the changes in the rules. Skeleton shots opposite page reveal bump to house chute dethermalizer which brings section up to the American rules.

the ranger

by SAL FRUCIANO

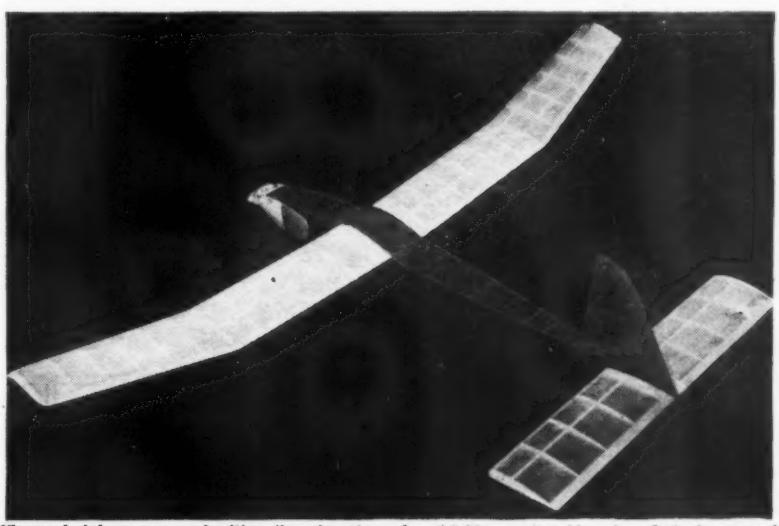
Your best bet in any design is one developed and perfected over a period of years. The Ranger line began in '48, held a '50 record, is the job you should fly in '51.

THE original *Ranger* was designed in late 1948, after attending the first post-war Wakefield contest in Akron, Ohio. At that contest we were able to study the various designs and note how the experts flew their ships. A good Wakefield model should have a fast climb and a slow floating glide to take home the hardware. In the Spring of 1949 we built the first of the Rangers, with what we felt embodied all the requirements of an efficient Wakefield model. Our first crack at Wakefield competition was at the *Northeast Eliminations* in 1949. The *Ranger* turned in a good performance and placed high behind Warren Fletcher. A second, and improved, model was made for the 1950 contest season with very gratifying results. On a typical California day in June '50 at a contest in Millville, N.J., the *Ranger* turned in a top job by taking First in Class D Cabin Event and setting a national record, which has since been broken.

When the new rules for 1951 were announced, some revisions had to be made to bring the ship up to date. The new rules limit the total of wing and stab area to a maximum of 294.5 sq. in. and the cross section area to a minimum of 10.015 sq. in. These changes were made with a notable increase in its performance. The complete rules were published in the February issue of this magazine. For competition under American rules, the 1951 *Ranger* requires extra fuselage cross section area ($L^2 \div 100$). The *bump* for the parachute dethermalizer achieves this area. Well, so much for its past, let's get to building.

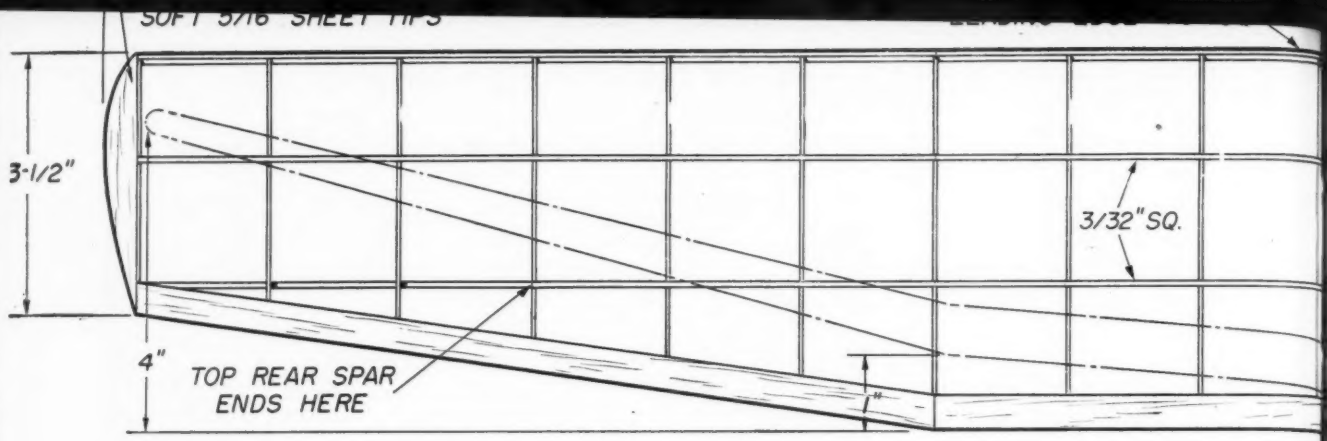
The construction of the *Ranger* is the conventional type, which, through the years, has been found to be the strongest, quickest to construct, and easiest to repair on the field. Before starting construction familiarize yourself thoroughly with the plans and photos. Start your *Ranger* by enlarging the plans to working size. In order to preserve your plans, put

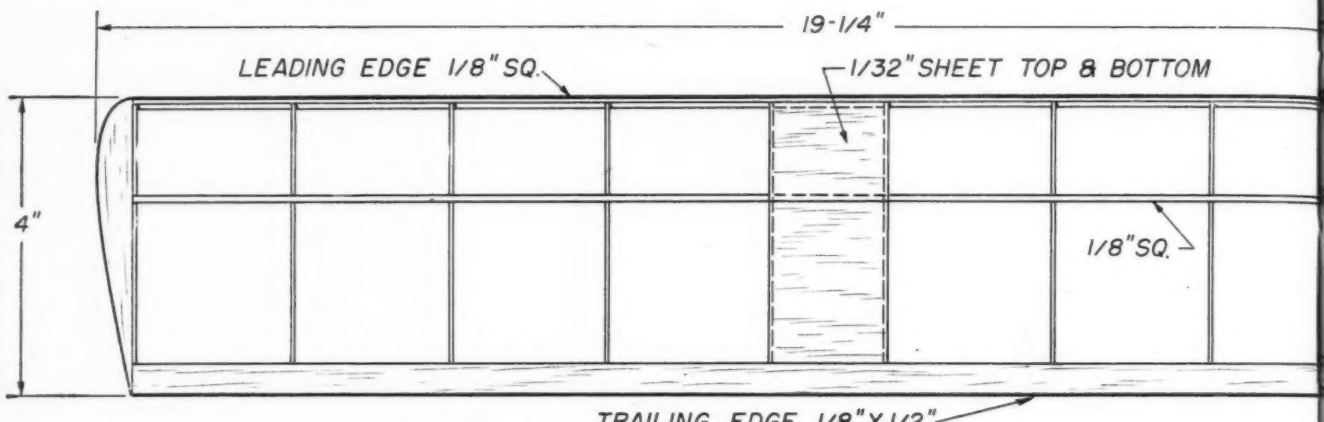
(*Turn to page* 42)



Construction is simple, rugged, light, and almost warp free. The two-bladed folding propeller and retractable landing gear insure minimum drag, hence the maximum gliding ability.

Wing and stab are covered with yellow Jap tissue for visibility against blue sky. Body is covered with two layers of blue tissue, grains opposed. Chute is made from Kleenex, is easily replaceable.



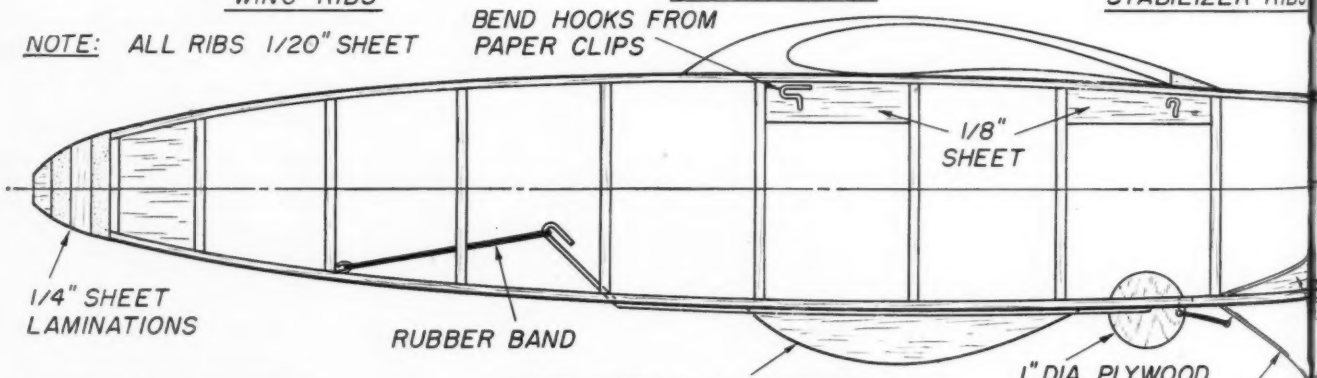


WING RIBS

CENTER RIB 1A

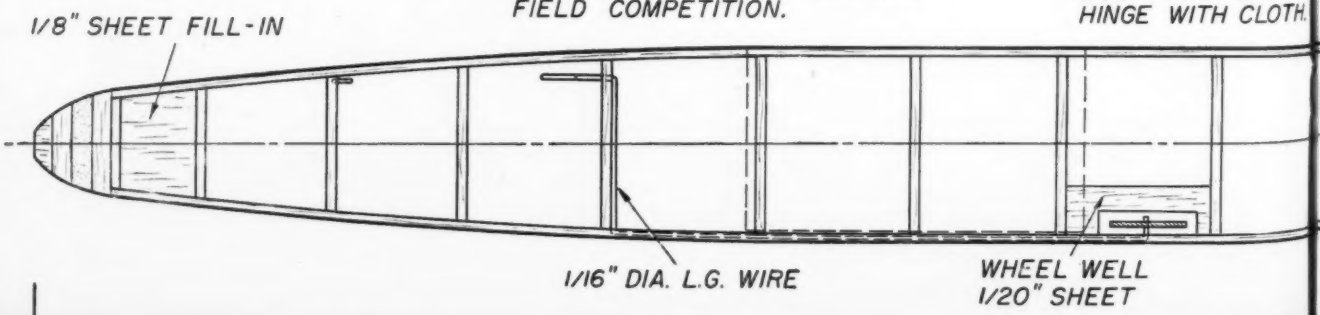
STABILIZER RIBS

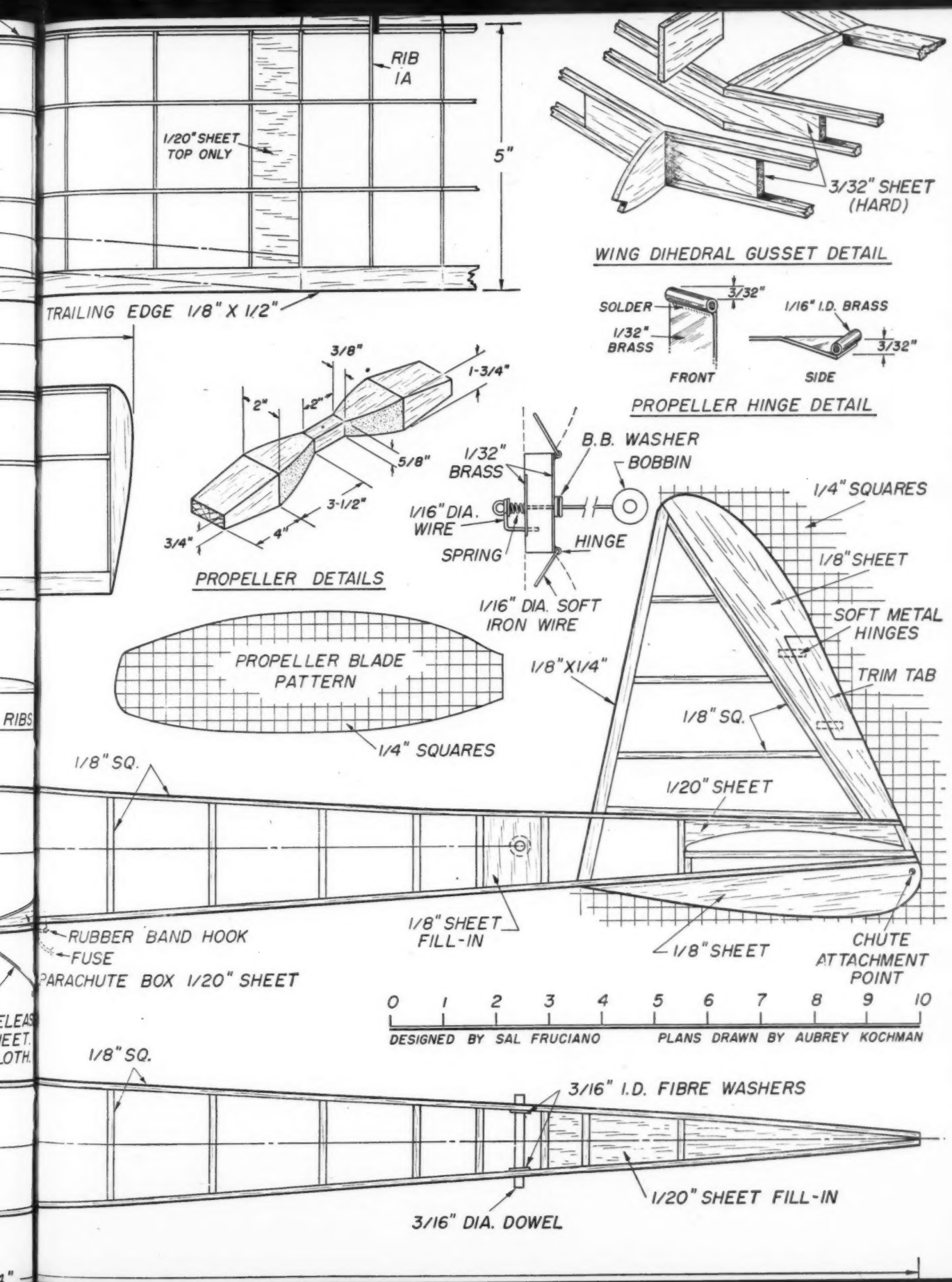
NOTE: ALL RIBS 1/20" SHEET



NOTE: LANDING GEAR SHOWN RETRACTED

NOTE: BUBBLE IS NECESSARY TO MEET U.S. CROSS SECTION RULE, BUT IS NOT NEEDED FOR WAKE-FIELD COMPETITION.



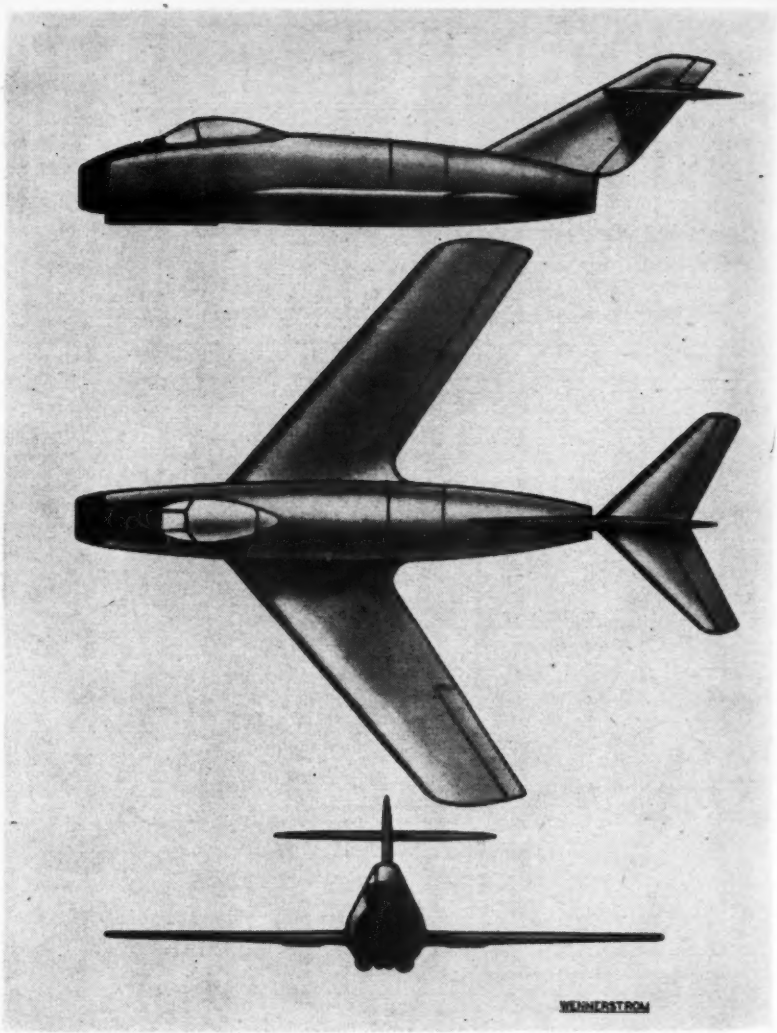

RIB
1A
1/20" SHEET
TOP ONLY
5"
TRAILING EDGE 1/8" X 1/2"
3/32" SHEET
(HARD)
WING DIHEDRAL GUSSET DETAIL
SOLDER
3/32"
1/32"
BRASS
FRONT
1/16" I.D. BRASS
3/32"
SIDE
PROPELLER HINGE DETAIL
3/8"
1-3/4"
2"
2"
5/8"
3-1/2"
3/4"
4"
PROPELLER DETAILS
1/32"
BRASS
B.B. WASHER
BOBBIN
1/16" DIA.
WIRE
SPRING
HINGE
1/16" DIA. SOFT
IRON WIRE
1/4" SQUARES
1/8" SHEET
SOFT METAL
HINGES
TRIM TAB
1/8" X 1/4"
1/8" SQ.
PROPELLER BLADE
PATTERN
1/4" SQUARES
1/8" SQ.
1/20" SHEET
RUBBER BAND HOOK
FUSE
PARACHUTE BOX 1/20" SHEET
1/8" SHEET
FILL-IN
1/8" SHEET
CHUTE
ATTACHMENT
POINT
0 1 2 3 4 5 6 7 8 9 10
DESIGNED BY SAL FRUCIANO
PLANS DRAWN BY AUBREY KOCHMAN
1/8" SQ.
3/16" I.D. FIBRE WASHERS
1/20" SHEET FILL-IN
3/16" DIA. DOWEL

RUSSIAN MIG-15

by CHALMERS H. GOODLIN

Small, light, powerful, very fast, is the opponent of our Sabres.

PLANE ON THE COVER



Shown here with 60 mm spin-stabilized repeating rocket launchers beneath the nose, the *MIG-15* was intended for high-altitude operations against our atom bombers, has pressure-tight cockpit.

AFTER the first couple of encounters between Russian-built *MIG-15* swept-wing jet fighters and our own *F-80's* and *F-84's*, the cognomen of "the Zeke of the Korean War" began circulation. The nickname is aptly selected. The new machine appears to be fast, maneuverable, and endowed with an excellent rate-of-climb.

Fortunately for us, we know a little more about the *MIG-15* than we did about the *Mitsubishi 00* in December of 1941. For example, we know its dimensions and its power—we know something of its history and its background; we know something about the men who designed the machine, their ideas on the how of airplane design. Compare this with the fact that nearly ten years after we got into World War II, few Americans know anything about Jiro Horikoshi, the designer of Zeke.

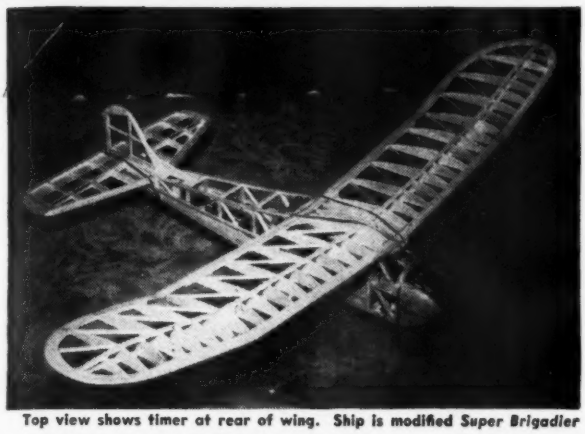
The first reports of the *MIG-15* were picked up in 1947, when Artem Mikoyan, Armenian-born airplane designer, was awarded the Stalin Prize for his work in what the Russians then publicized as "the world's fastest fighter." The awarding of this prize to only one member of the team that had produced a large number of successful aircraft, including three previous jets, aroused speculation as to the possibility that the two men had come to the parting of the ways. The lesser-known member, the tiny, Hitler-moustached Mikhail Gurevich was reported to be fed up with the brilliant Armenian's hogging of the limelight, and had gone on his own, exhibiting a top-secret medium jet bomber of his own creation the following year. Well-founded reports state that the plane known as the *MIG-15* is mislabeled, that it is actually the Mi-1, the first aircraft designed by Mikoyan alone. There was an *MIG-15*, an obscure, high-tailed experimental jet aircraft, built along the lines of the German DFS-8346 rocket plane. Only two or three of these aircraft were reported to have been built before the team of Mikoyan and Gurevich broke up. This airplane obviously influenced Mikoyan's later design, and bears a great resemblance to it. The designation *MIG-15* received a lot of publicity abroad, and the experimental plane's designation has been attached to the production machine.

The *MIG-15*, as we saw it in Korea, is an exceptionally clean low-wing monoplane, powered by a Chelomey copy of the Rolls-Royce Nene engine, with an output of 5500 lb. of static thrust. It is conceded to be one of the fastest jet currently being used in operational numbers, having a top speed reported as high as 680 mph at 35,000' with full military equipment.

A singularly small machine, its span is 33' 6", as compared with 37' for the *F-86* North American Sabre, its U.S. counterpart. The *MIG-15* uses the typical 35° sweepback on its wings and tail surfaces used to delay the formation of compressibility shock waves, the so-called Busemann planform.

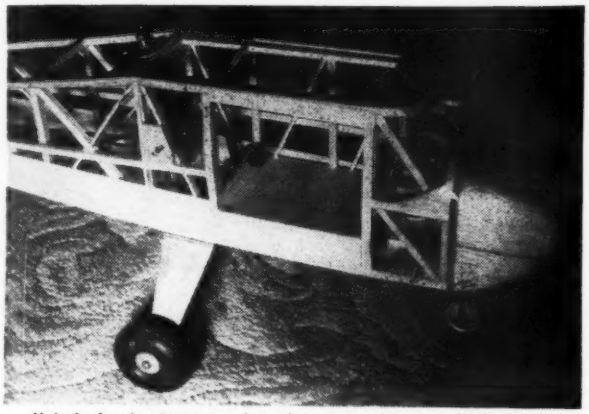
What has puzzled American analysts is the maneuverability of the *MIG-15*. Students of Soviet design reject the premise that the Russians have adopted the Japanese approach to the subject by building a hazardously flimsy structure. Field examination of the wreckage of the few *MIG-15's* that were shot down in Korea revealed a few tell-tale facts. The *MIG-15* has a simple, rugged structure—a structural approach typical of Mikoyan—heavy skin, supported in the simplest uninterrupted structure conceivable. The ribs were heavy stampings, sparsely re-inforced; a simple two-spar plus torque-box lead-

(*Turn to page* 50)

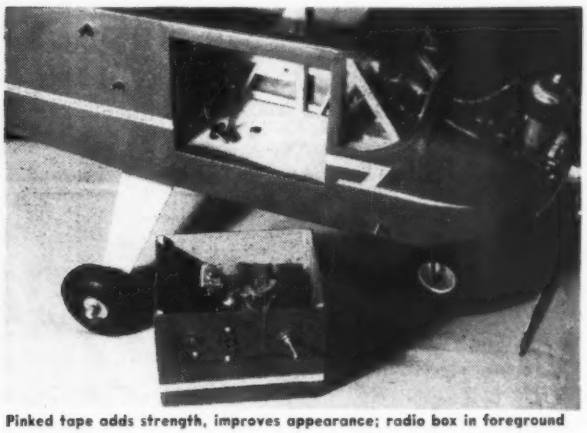


Top view shows timer at rear of wing. Ship is modified *Super Brigadier*

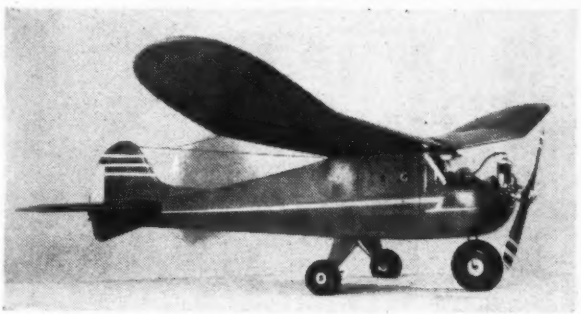
The author with an earlier R. C. ship, quite similar to the new job



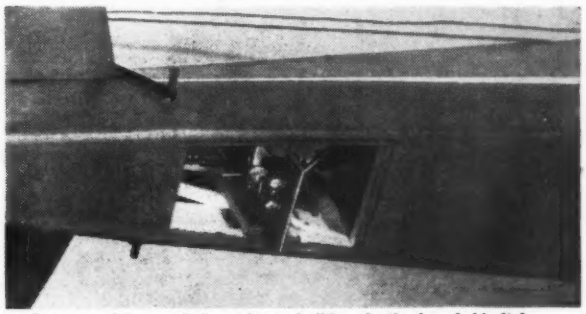
Note husky structure around receiver compartment, and tricycle gear



Pinked tape adds strength, improves appearance; radio box in foreground



Large nose wheel helps absorb rough landings. Ship is silk-covered



Escapement is mounted on plywood slide; plastic door holds it in

RADIO CONTROL IDEAS

by FRED C. ULRICH

THESE notes are written around my fourth radio controlled model which I call *XPR-4*. I have tried to incorporate in this ship all the things I found lacking in the three previous models. I have read all the articles in M. A. N. since I became interested in this phase of model building, and enjoyed very much the story of the *Citizen* and of Walt Good's *Rudder Bug*. All these articles have been of great help.

The *XPR-4* weighs 3 lbs. 14-1/2 oz., has a 58" wingspan and is powered by an *Ohlsson* 23 with a 11-6 prop, which gives power to spare. The plane is a modified *Super Brigadier*, and is set to climb about 100' per minute, which is ideal for a plane with only rudder control. By having a slow engine rpm and a large propeller, slow flight is obtained; therefore more rudder can be applied under power and in dead stick landings you still have sufficient rudder movement for good control. I have found the tricycle landing gear best if you want realistic take-offs and landings. The front wheel, which takes a real beating in bad landings is a *Veco* of 3-1/2" diameter, while the rear wheels are 2-1/2" *Vecos*.

The *Aero-Trol* receiver was made simple to service by having the entire radio unit slide out of the plane in a special radio box, which also carries all radio batteries and switches. All that is needed to hook it up in the *XPR-4* is to connect the antenna and push in one plug. Tuning can be done outside the plane, if desired.

I always wanted to see the movement of the escapement when installed inside the ship, so I used a plastic inspection cover at the bottom of the fuselage. The escapement slides out for adjustment, if necessary, and also for replacing the rubber.

For engine ignition and also for escapement use, the Burgess #5370, 4-1/2-volt battery gives fine results. Smaller batteries could be used, but the saving in weight didn't make up the difference in reliability.

The plane is ruggedly built and proved-out in testing, having landed square on its nose at least eight or ten times. At this writing, however, it is in perfect flying condition with twenty-three 5- to 10-minute flights on record. In the short time I have been flying radio control planes, and not knowing a thing about radio other than for use in models, I would like to encourage other builders to try one and have the time of their lives.

There are other suitable kits on the market.

"SPITFIRE" UNVEILS ITS LATEST ADDITIONS!

"Spitfire" TORNADO

MINIATURE INDIANAPOLIS RACER

ASSEMBLED and READY to RUN

Speed Ratio 15 to 75 MPH

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ALL THIS FOR ONLY $9.95

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  Made of durable fuel-proof hi-gloss colored plastic.
- BABY "SPITFIRE" .045 ENGINE & TANK
  The proven dependable engine.
- "SPITZY" NITROMIC GLOW FUEL
  One full pint of power.
- CONTROL CABLE CENTER POST
- REDUCTION GEAR UNIT
  *Safe, enjoyable speed (Approx. 15 MPH).
- FLYWHEEL & STARTING CORD
  Attaches directly to engine for easy starting.
- "SPITFIRE" GLOW PLUG & CLIP
  With battery plug-ins.
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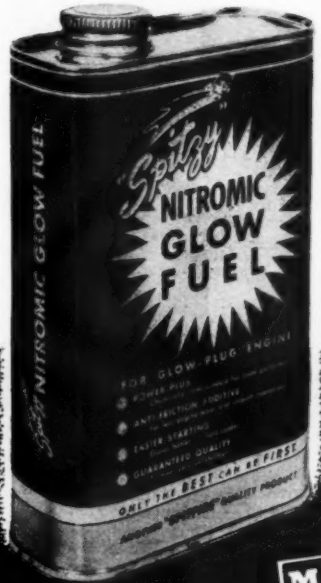
"Spitzy" NITROMIC GLOW FUEL

JUST THE RIGHT FUEL FOR GLOW PLUG ENGINES

- **POWER PLUS**
  Chemically compounded by master chemists for PEAK PERFORMANCE.
- **ANTI-FRICTION ADDITIVE**
  For less engine wear and smooth operation.
- **EASIER STARTING**
  Glows hotter—Runs cooler.
- **GUARANTEED "SPITFIRE" QUALITY**
  Cleans as it runs—Will not gum up engine.

A Pint of Power **85¢**



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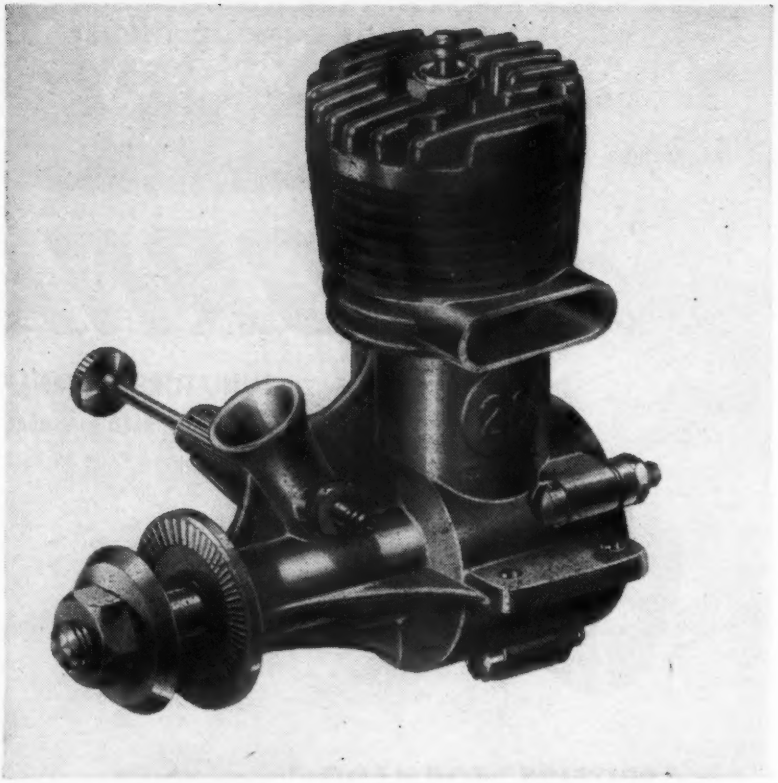
MEL ANDERSON *Manufacturing Co.*
1819 THIRD AVE., LOS ANGELES 19, CALIF.

ENGINE REVIEW

The VECO 29

Well-known kit manufacturer introduces all-round engine of special interest to free flight, stunt fans

by JOSEPH WAGNER

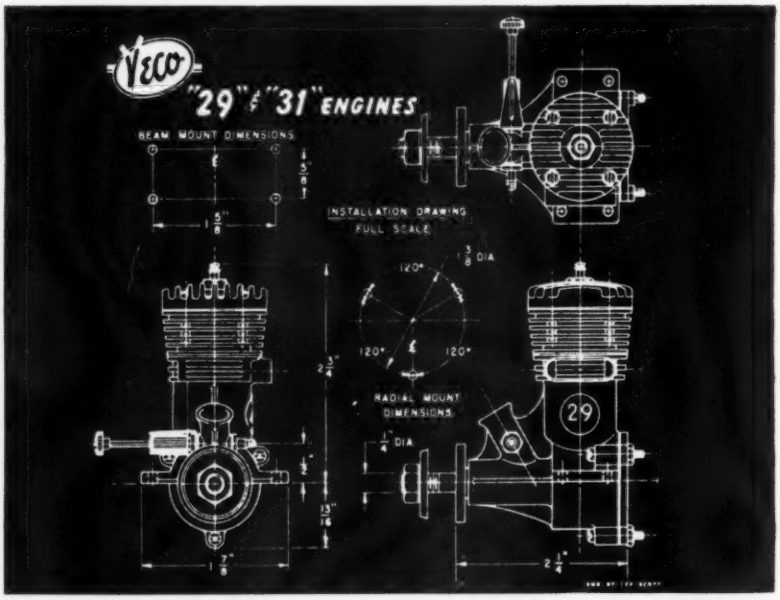


External features include mounting on the thrust line, provision for radial mounting, short exhaust stack for accessibility of engine mounting bolts, space for easy removal of the glow plug.

THE *Veco 29* is the first of a series of miniature engines designed and produced by the *Henry Engineering Company* of Burbank, California.

The *Veco 29* is a lapped piston, crankshaft rotary valve type engine, exclusively designed for glow-plug ignition. It has a bore of .725", with a piston displacement of .299 cu. in. Among the features contributing to the ease of operation of the *Veco 29* are: lug mounting flanges level with crankshaft center line, so that the engine is mounted on its thrust line; a short exhaust stack for easy access to mounting screws when beam mounts are used; provision for radial mounting; cylinder head fins well back from glow plug to allow quick removal and replacement of plug; and a 1-1/4" extension knob on the non-sensitive, vibration-proof needle valve.

The *Veco 29* is primarily intended for free flight and controline stunt models, and is engineered to provide the three necessities of engine performance for these types of flying: easy starting, steady running under a wide range of fuel levels, and plenty of power. It is ruggedly constructed. The cylinder sleeve is machined from steel, centerless-ground, hardened and honed, with six integral cooling fins for rapid and efficient heat dissipation. The piston is machined from *Meehanite*, a high carbon steel alloy, hardened and ground to within .0001 of absolute roundness, and individually fitted to a matching cylinder sleeve. The wrist pin is hardened tubular steel, ground, and furnished with an aluminum pad at either end to prevent scoring of the cylinder walls. The connecting rod is drop-forged from aluminum alloy. It has integral bearing surfaces. The crankcase, crankcase rear section, and cylinder head are all pressure die-cast aluminum alloy. The crankshaft bearing, of leaded bronze, is cast in place.



The crankshaft is machined in one piece from high-grade steel, hardened and ground. Particular attention was paid in the design of the cylinder head to eliminate warping and distortion in service.

The needle valve of the *Veco 29* is of the spray-bar type, placed as closely as possible to the crankshaft center line to allow easy mounting of a stunt tank with the fuel line level with the needle valve. The needle itself has an extremely long knurled sleeve that engages the locking clip, effectively preventing vibration from changing the setting of the needle valve, regardless of its position. The needle valve setting is not critical, since the point of the needle has an unusually long taper.

Another design feature of the *Veco 29* is its low fuel consumption. The engine has a high crankcase vacuum and extremely efficient porting; obtaining the maximum power and speed from a minimum of fuel. It runs at 6,000-13,000 rpm, develops maximum power at about 12,000. The Veco 29 weighs about 7 oz., is furnished with plug, Veco 9-7 prop.

REPORT FROM THE WEST

by Jim Saftig

RECENTLY at Medford, Oregon, the *Medford Prop Nuts* staged their 4th Annual Free-Flight contest. This meet was held on the Agate Desert near Camp White and over 90 models were entered. Fliers came from all over Oregon to compete for over $500 worth of prizes. Bob Ottoman was the star that shone, having gathered a 1st in AA, A, and C; 2nd in Cabin and Stick; 3rd in Towline; and 1st in Jetex. The unusual feature of the contest was that Bob is one of the beginners with not even a full season under his belt, and he flew in the Open division. Who helped you pack home the hardware, Bob? Bob flies his own design and calls it *Flat Top*. Ottoman plans to drop in at Sacramento and the San Francisco area this winter to try his luck with the lads over thataway. At the same meet, Eugene Bartel of Dallas (not in Texas) piled up a time of 15:05.0 in AA and has applied for a national record. Eugene flew in the Senior division. Dick Simonson of Medford won the worst crack-up award as well as the beautiful bronze placque for the most beautifully finished model. Bartel, Ottoman, and Ed Gilkey, Central Point, each won gold plated miniature spark plugs for totaling highest times in their classes.

Jim Walker dropped in on us while on one of his famous tours. Naturally, he had that big Suburban bulging with his famous A. J. models. We were particularly interested in Walker's radio gear. The famous "lawnmower with the brain" really lived up to its reputation by doing everything but talk. The radio controlled plane that Jim flew at Camp Pendleton was a beauty to watch, and the crowd gave him a well deserved hand.

Walker demonstrated his newest AA job, the *Firebaby*. These little ships are excellent trainers, being able to take quite a beating, and fly mighty well. The old two at a time flying is very easily accomplished with these amazing models in miniature simply by holding one or the other closer to the flyer depending upon which is the faster.

A while back, the *Portland Fireballs* held a meet at Westmoreland Park that was sponsored by Jim Walker and some of the Portland dealers. The results gained were far beyond expectations. The contestants were instructors and all scoring points were made not by them, but by their students. A student could be anyone interested in model flying who had never flown a U-control ship before. Originally it was intended that only youngsters would be the flyers but as the meet progressed, it was found that the dads present were just as eager as the kids so they too were allowed to do their stuff. As each student signed up, he was turned over to an instructor-contestant whose job it was to teach him the basic fundamentals of controline flying, such as fueling the ship, starting the engine, and take-off; he must also fly at least twenty laps unassisted. Each student was allowed three attempts to gain a maximum of 30 points for his instructor. One point was allowed for each lap and ten laps or over was an official flight. If a student flew twenty laps or more, he became eligible for bonus points in the following manner: 2 pts. for fueling the plane, 3 pts. for starting the engine, 2 pts. for level flight and good plane control, 2 pts. for take-off, and 1 pt. for a satisfactory landing.

The *F.A.S.T. Club* held the final Team Racing meet of the season December 10th at Santa Anita parking lot. Keith Storey did a pretty thorough job of cleaning up the hardware, but Granger Williams and his brother Lawrence won first and second place in total points for the year, respectively. Granger was far out in front, having a total of 1165 points for 14 races; his brother checked in with 780 points, and Keith Storey marked up 750. These points were won for each trophy dash, lap race, etc., and were carefully tabbed for final totals at the end of the year.

Hal Simmons, Lee Ross, and Tom Moore have started a model club with 25 youngsters on the roster. These lads range from 8 to 14 years of age. They have built and flown two gliders of the *Clouduster* design and are beginning to talk like experts already. The older boys are going into U-control flying on available tennis courts using 20' lines, the reason being that the closest free-flight field is a good 30 miles away.

The *San Diego Aeroneers* are looking forward to their new field that is being worked on at the present time. The site will be located a short distance north of their former flying circle. Much credit is due to Bill Gibbs of Gibbs Airport now known as Montgomery Field. Bill has always cooperated with the Aeroneers in every way at all of the annual and monthly contests.

The *San Diego Airliners* are at last coming into their own again through the efforts of City Manager O. W. Campbell, Commodore Tom Allen of the *Model Yacht Club*, and Bill Scott of *Hillcrest Hobby Shop*. At the present time, plans have been made to have the Airliner site adjacent to the excellent model yacht basin along the Causeway by Mission Bay.

The *Orange County Thunderbugs* held another of their very famous all-stunt contests and they are again to be congratulated. This club goes all out for the contestant by making registration, line pull tests, and judging click off in a very short time. Each flight made by a contestant was judged and his points posted on a large board so that each of the other flyers could see just where he stood in point standing.

It has been some time since we have seen Davey Slagle, but we happened to catch a glimpse of him at the recent *Orange County Thunderbugs* meet. No, Davey wasn't flying competitively but was very involved with one of the AA free-flight jobs on tether. We had a chat with Davey's folks who tell us that their son is quite interested in flying gliders—the big ones. They also informed us that he is still flying models as he has quite a few of his older ships that still do the job. Young Slagle is the lad who won the Jim Walker National Stunt Trophy 3 years in a row, a record that has never been equalled.

While we're on the subject of stunting, we would like to pass on a bit of information that Mom Robbers gave us pertaining to Janyce Wood. Janyce took a 2nd place at a recent W.A.M. contest in class AB, Stunt-Beginner by piling up 299 points. Due to the fact that she made such an outstanding showing, she was moved up to the Advanced group. Mom goes on to tell us that Janyce, who is only 14 years old, is really keeping the other flyers on their toes. J. Lenderman said after flying against her in the *Robbers Trophy Challenge*, "Boy, I sure knew I was in a battle." Who says the gals can't fly.

The *San Bernardino Flying Wheels* played host to the many model clubs on the coast at another of their Semi-Annual contests. This club is probably one of the smallest free-flight clubs in the country and is a mighty smooth running outfit. The *Wheels* carry nine members on the club roster, yet they are very well known throughout the

Western States as one of the most active clubs in flying circles. At their last meet, none of the club members flew. They concentrated their efforts to make the *Camp Haan* meet a well run and thoroughly organized affair. Wally Short and the rest of the club members solicited the city of San Bernardino business men and came up with lots of merchandise and a bunch of swell trophies.

The *Haan* meet brought out one of the most beautiful free-flight jobs to be seen in many a day. Toshi Matsuda sported a *Zeek* with a two-tone wing. The two colors ran lengthwise from one tip to the other on both bottom and top sides. The front section of the wing was yellow and the rear fuschia separated by a fine line running between them. The lower surface was painted in the same fashion except that the color scheme was reversed. The stab and rudder carried out the same theme. The thermals were noticeable by their absence but the weather was perfect. *Zeeks* and *Hogans* were the most popular ships at the meet, but Larry Boyer sneaked in to knock off 1st place in class B with his *Mac 29* powered *Powerhouse*. Garry Ball carried off the Junior Sweepstakes hardware, and Dave Converse swept the Open Class. High time of the day went to William Daniel Jr.

The challenge meet between the rubber and gas boys we told you was coming up took place at *Camp Kearney Mesa*, San Diego. The rubber team consisted of Ernie Wrisley, Fudo Takagi, Red Everitt, Dick Everett, and Harvey Patten. The gas team consolidated the efforts of Denny "Hogan" Davis, Nat Antionelli, Les "National Champ" Bartlett, Gary Ball, and L. O. Corbly. The times were very close with the gas boys winning by approximately 1½ min. The flight cards were lost about half way through the contest but times were totaled by means of the individual flight cards. Tough luck hit Patten's rubber job on the last flight when his rubber motor cut loose inside the fuselage and really mangled it. Due to this unfortunate accident, the rubber boys lost that last flight which could have meant winning the contest. A re-match is being cooked up which may call for a two out of three contest.

Plans are being made to hold a state-wide radio control meet in the spring of 1951. Flyers from the *San Francisco Bay* area will compete against the R.C. men from Los Angeles and San Diego areas. Due to the fact that Fresno is just about the half-way point and flying sites are ideal for this type of flying, the contest will probably take place at that city.

We'd like to give June Dyer another plug for the hard work that she has been doing helping the *Northern California Free-Flight Council* click. June has helped out immeasurably by getting trophies at cost, working at all of the contests, attending all the Council meetings, and has even put out her own money when necessary to help out over the rough spots. Nice going, June!

Tom Moore, Secretary of the Council, tells us that the AA engine far surpasses all other entries (by a margin of approximately 4 to 1) when Council meets are held. Tom has also contacted the other modelers up his way and they all agree that the rules should be left as is for at least another year. We heartily agree with you modelers—let's keep the rules as they are for at least another year.

Francis Stewart of the *Bakersfield Gas Model Airplane Association*, tells us that his club, the *Taft* club, and the *Visalia* club, have discussed the *A.M.A.* rules and are in favor of leaving them as is except they would like to erase all records at the end of each year. This falls in line with about all of the **F.F.** men to whom we have talked.

It has been noted that many more of the pros, experts, and advanced flyers are gradually turning their talents to helping the novice builders. In keeping with this, we find that a beautiful trophy known as the *Burton Wood Trophy*, has been donated and will be a perpetual club award. Mr. Burton Wood of the *Pittsburg Cloud Busters* exhibited this beautiful ivory and gold-tone trophy at a recent *W.A.M.* meeting Mr. Wood is a staunch admirer of those better modelers who devote a good part

The April issue will contain some pleasant surprises. Don't miss it! On sale beginning Mar. 2nd.

of their time to assisting and advising aspiring beginners. This award will be given semi-annually and will be an incentive for the better modelers to help the novice builders. We will give you more details on this trophy in our next column.

Russ Johnson tells us via the Thermal Hook that two new model clubs have been formed in the San Gabriel area. The *Hi-Tailers* is a free-flight club, as is the Pasadena *Piston Pushers*. The clubs plan to hold contests open to all and prizes will consist of a trophy for high time and merchandise. The newly elected officers of the *Hi-Tailers* are: President. Russ Johnson; Vice-President, Chuck Jones; Sec. Treas., W. Cassellberry. The *Piston Pushers* have the following officers: President, Chuck Jones; Vice-President, Gene Roberts; Sec. Treas., W. Cassellberry. It looks as if Cassellberry and Jones are two much needed eager beavers. Good luck with the new clubs, fellas.

The *Los Angeles City Council* has approved the use of the Sepulveda Basin for model flying. Thanks are due Leo Caton and the rest of the boys in the *San Valeers* and *Valley Hawks*.

The Ranger

(*Continued from page* 31)

a piece of waxed paper between the plan and the work, or rub the plans with soap where there is a glue joint, to prevent sticking.

Body: Select four hard 1/8" squares to be used for the longerons. Care should be taken to see that these pieces are as identical as possible in weight and grain. The uprights should be medium-hard 1/8" squares. Lay down the first side and build the second one directly on top to insure them being identical. When both sides are dry remove from the plan and separate by carefully sliding a double edged razor blade between the sides. Assemble the two sides by gluing the rear end together and inserting the widest crossbraces. By using small rubber bands to hold the two sides in line while inserting the crossbraces, you will find the body almost builds itself. When the crossbraces are all in, fill the nose, and where the dowel goes, with 1/8" hard sheet. To prevent the dowel from crushing the rear 1/8" sheet, glue 3/16" i.d. (inside diameter) fiber washers on the inside.

The landing gear is of the single wheel retractable type and is the final step in completing the body. It is bent from 1/16" music wire and attached to the crossbrace shown on the plans by heavy thread. Applying several coats of cement to the thread will form a tube for the landing gear to ride in when dry. The wheel is 3/4" in diameter, and can be made from either hardwood or plywood. You will notice the gear is off center to make room for attaching the streamlined blister which can contain a parachute dethermilizer or can be used to bring the model up to American cross section requirements.

Wing hooks are bent to the shape shown, and glued to the sheet on the body. This type of hook will provide the pop-off wing so essential when extra light construction is used. The hooks can be bent from light gauge wire or paper clips.

Wing. Using a semi-multi spar construction a considerable amount of weight was saved, and resulted in a strong almost warp-proof wing. Start building by making a rib template from plywood or thin aluminum. Cut the number of ribs required from firm 1/20" quarter-grained sheet, taper the tip ribs (notch for leading edge and spars), pin together, and sand smooth with medium fine sandpaper.

The spars are hard and straight 3/32" squares. Pin down trailing edge first, then glue ribs in their position, and add leading edge. When dry, lift from plan, cut, and glue in dihedral. (Dihedral is 1" at the first break and 4" at the tips.) Next add top and bottom spars and 1/8" sheet gussets at the joints. Sandpaper and cover center section on top with 1/32" sheet. The center section fairing is made by gluing 2 pieces of soft 5/16" balsa sheet to former 2A. Complete the fairing by gluing pieces of 1/8" sheet over the center section of the wing with the grain running spanwise. Round off to the shape shown and sand smooth. When you have completed this, set the wing aside and start on the tail assembly.

Tail Assembly. The stabilizer is built much in the same manner as the wing. These ribs are also cut from firm 1/20" sheet. The spar is used only on the top to help prevent and resist warping. This center section is also covered with 1/32" sheet. The rudder is built flat on the work board, with lightweight stock being used throughout. When dry, sand to a streamlined shape. A tab is cut in the sheet stock and soft metal hinges are inserted to allow it to be bent for turn adjustments. This is best done after rudder has been covered, as it makes for a neater job.

Propeller. This brings us to the final and most important piece of work, which makes the *Ranger* the contest winning model it is. A good propeller can make or break any model. I have seen well constructed ships turn in one poor flight after another, all because of the lack of an efficient airscrew. I have also seen poorly built models become contest winners time and time again when a properly designed and carved prop was used.

The *Ranger's* prop was carved from a 17" x 1-3/4" x 2" medium-hard, straight grained balsa block. Start by laying out the blank as shown on the plans, and cut

off the excess balsa with a sharp knife around the hub and tips. Carving should be done using long strokes, being careful not to take too deep a cut. Work down each blade roughly to about 1/8" undercamber. Then by using sandpaper, from coarse to fine, work the blades to its final undercamber of 3/32". By using the prop template shown on the plan you can be assured the blades will be of equal size and shape. Time spent in carving a good prop will pay off in an unlimited number of satisfying flights. The hinge is bent from a strip of 3/64" half-hard sheet brass to the shape shown on the plans. Two pieces of 1/16" brass tubing are soldered to each end to complete hinge. You will note the way the hinge is bent to an angle, to insure a close fit of the blades against the sides of the body. Use soft iron wire to attach the blades to the hub. The hub, and blade wires are then given several coats of glue, and wrapped with gauze. To finish the propeller, I usually apply 3 or 4 coats of *Testor's Sanding Sealer*, sanding down between each coat with fine sandpaper. By doing this, your prop will have a smooth finish and high lustre. The nose block is made up of laminated pieces of hard balsa wood 1/4" thick. Drill the hole for the 1/16" wire shaft and sand to the shape shown. A large face bushing is used on the back side while a small face bushing is used up front. A hole is drilled in the large face bushing to receive the 3/4" flat head wood screw which is used for a tensioner stop. The complete propeller and nose block assembly will include on the 1/16" wire shaft from front to back—washer, spring, washer, prop., B-B washer, small face bushing, nose block, large face bushing, wood screw, and a large size *Jasco* bobbin.

Now that the construction is finished let's cover the *Ranger* and install the parachute dethermalizer. Use a good grade of Jap tissue for the covering. The wing and stab are covered with yellow tissue, with the grain running spanwise, which for visibility purposes can easily be seen against a blue sky. Water shrink the tissue and apply three coats of a good grade dope to the surfaces. The body was double covered with dark blue tissue for strength. The first layer of tissue should have its grain running vertical to body, in the same plane as the uprights. Water shrink and when dry give it one coat of dope. The second layer should have its grain running lengthwise, or opposite to the first layer. Repeat the same process of water shrinking, and when dry, dope it 3 or 4 times. The rudder is single covered, the grain running vertical.

Parachute Dethermalizer. This is a very important item if you are considering competition flying. It takes very little time to make and will save you many hours of construction time if you happen to lose a model in a thermal while test flying. If you are using the *Ranger* solely for Wakefield flying, a box is built just aft of the wing to hold the 'chute. If you are using the ship, for the American rules you can stow the 'chute in the streamlined cross-section blister. In either case, the box is built of hard 1/20" sheet balsa. The trap door is actuated by a small rubber band and is released by a fuse. The parachute was an ordinary Kleenex tissue with light thread being used for the shroud lines. The Kleenex tissue was selected for two reasons: one it is very light, and easy to pack; two it is very easy to replace if your model should become caught in a tree, and the 'chute torn on the branches. The shroud lines are attached to a hook on the body beneath the trailing edge of the stabilizer.

Rubber Power. The next most important item, besides a good propeller is a powerful rubber motor. The motor I used was made up of 14 strands of 1/4" black *Dunlop* 44" long. On windy days a shorter motor of 40" was used for power. A rubber motor, in order to deliver its best, should be properly pre-wound, outside of the ship. To do this, lube your motor with a mixture of tincture of green soap and glycerin, attach one end to the prop assembly, the other end to a door knob, and using a hand drill for a winder proceed to wind. Pre-wind the motor about 50 winds the first time. Repeat this process over and over again each time

increasing the number 5 to 10 winds until a near maximum of turns are reached. A properly pre-wound motor can easily last a full season of flying. Long life can be insured by washing your motor after each day's flying and by storing in a cool dry place.

Adjustment and Flying. When you have finished the *Ranger* and have pre-wound the motor, select a calm day for test flying. If possible, test glide your model over some high grass to cushion it, should it stall or dive. Should your ship be out of balance, do not change the wing position but trim it by using small bits of clay adding them to the nose or tail. When the proper balance is obtained, bend the rudder tab about 3/32" to make the *Ranger* glide to the left. On the first power flight give it 100 hand winds, put in 1/16" right, and 1/16" down-thrust and launch into the wind. Note how the model tends to turn under power and in the glide. Should the model stall, add a bit more down-thrust, and should it tend to fly straight ahead or in very wide circles to the right, add some more right thrust. By slowly using more hand winds and making thrust adjustments, if necessary, you will find the *Ranger* is just about completely adjusted, and ready for power. Your model may fly differently under high power so be careful. I have found that under high power I can remove most of the down-thrust, and by adding right thrust, have the model climb in a steep spiraling right climb. When the power is spent, the ship will do a figure 8 into a floating left glide. On the record breaking flight I used 180 winder winds (720 turns).

Cargo Clipper

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Before starting construction, carefully pick out good balsa. Select strong light wood that is not mush or, on the other hand, not so hard it feels like oak. Tissue must be used for covering to hold down the weight.

The fuselage is a variation of the standby crutch idea. Lay out the crutch from 1/8" x 1/2" balsa, then add formers B and C, and the 1/16" sheet sides for the top keel. Cover the entire bottom of the fuselage, beneath the crutch, with 1/16" sheet, first adding the top nose block. The packet sides are cut from 1/16" sheet. Make the packet nose block and cement it to the packet sides; add the bulkhead and cement the side ends together. Note that the bottom sheeting of the packet has the grain running crosswise to the airplane. When the packet is completed, cut out for the wheel, then add the wheel and axle, being sure to cement well.

The stabilizer uses multi-spar construction. After cutting the ribs, cut the notches making certain the leading and trailing edges are cemented in place. Take the measurements from the plan.

There are two center ribs which sandwich the rudder. The rudder is cut out of 1/16" sheet and sanded smooth, then cemented in place. Notch the rudder, leaving the stabilizer spars full strength. Add the tips which are cut from soft balsa. These are shaped as shown on the plan.

The wing is made in the same manner as the stabilizer except for dihedral. Put the cabane in place (in the same manner as the rudder is attached to the stab), along with the wing fairing. Cut out the firewall, adding the top formers to this plus the sheet covering. The K & B .049 was used here as the tank set-up allowed a convenient firewall location.

Dry cover, although wet covering is suitable. However, applying wet tissue is a job. Wet the covering after it is applied with a swab of the same tissue, as this will not puncture the covering. When doping, thin out the dope 50% with thinner to prevent warping.

Flying. Select a grassy place for gliding. This model will need the payload in order to balance. Any additional weight should be placed on the c.g. The packet can also be shifted to obtain balance. Hand glide the model. The incidence in the wing and stabilizer must not be changed. Add weight to the pod until the glide is flat and straight; do not have it circle.

Start the engine, and with model in hand, run along into the wind. You will feel the model become lighter and soon it will lift out of your hand. Make certain that the model does not circle right or left but goes straight into the wind as this will aid it to climb. When flying in calm air, the model will not lift as much as when it is climbing into the wind. As this model only has to fly 40 sec., it has 20 sec. to go up and 20 sec. to come down. This is best done by sending it straight into the wind. If the model glides straight forward and turns when power is applied, offset the engine to pull away from the power turn. A little at a time will show results.

The Half Shot

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as shown on the drawings and test glide again. This process of shimming up the stab should be continued until the desired glide is a circle of approximately 100' diameter. Before attempting power flights, strap on your tank to the side of the fuselage (we used a small eye dropper held on the side of the cheek with rubber) and test run your engine, obtaining the leanest needle valve setting possible when holding the model nose up, at approximately 70°. This will assure you of a constant fuel supply at all times in the climb. The first power flight should be attempted with an engine run of no greater than 5 secs. at full power. The model should climb to the right in fairly tight circles without power stalls or a looping tendency. If any trace of a stall is evident, a little down-thrust will remove it. When you are satisfied with the climb fill the tank for a 15 sec. run and watch her go. A word of caution: that wire on the rudder is for a dethermalizer, so don't forget to use it. Loop several strands of 1/8" rubber around the 1/16" dowel and under the rudder wire. A single, twisted loop of thin rubber around this wire and the fuselage wire with a piece of heavy string soaked in a saturated solution of potassium nitrate, provides effective means of getting this ship down in a hurry.

World War I

(*Continued from page 23*)

lower center section were carried right across this nose section, thus serving a double function.

Fittings for attaching the landing gear struts, and center section struts, also were used to hold the structure together where they were applied. Also built into this forward section were fittings for such things as the armament and fuel tank. This compact unit, with most of its contents installed, came to the assembly lines ready to be attached to the rear section.

The rear section was an ordinary wire-braced structure but featured at its rear a top, bottom and side panelling of plywood, for purposes of stiffening the vertical knife edge. The rear panelling was cut out on the sides to form a girder-type bracing; repeated on top and bottom with the addition of circular lightening holes. Longitudinal, horizontal and vertical members were made of spruce; the plywood panelling of laminated hardwoods.

Forward panelling members were attached with screws and bolts, the rear panelling with screws. Other members were held together by stamped steel fittings bolted into place and carrying anchorage for the wire cross bracing.

The forward and rear fuselage assemblies were joined by butt joints and fish plates. This formed the basic structure for the streamlining provided in the production model that was not incorporated in the prototype briefly described last month.

This streamlining was applied to the top and sides, and began with the circular firewall at the nose. The first set of formers were circular, carrying out the general shape of the cowling. Subsequent formers towards the rear of the fuselage were trapezoidal and diminishing in size. These formers were made of three-ply, probably die cut to conserve weight. Two wood strip stringers on the upper surface and the sides of the fuselage gave the fuselage its irregular octagonal cross section, except at the nose where an additional four short stringers preserved the cowl's roundness.

Upper decking in front and behind the cockpit was aluminum sheet. Pilot's controls were conventional; the rudder bar, however, was located immediately behind the firewall which put the pilot's feet and legs under the rear bearing of the engine.

Instrumentation of the *D.H.5* was very complete for the period. Equipment to the pilot's right included two fuel lines with stop cocks; and a change gear to permit adjustment of elevator control movement. Directly in front of the pilot, on an instrument board were the airspeed indicator, tachometer, altimeter, ignition switch, compass and watch. On the pilot's left were the throttle, a flow valve controlling engine lubricating oil, and a hand pump to provide air pressure in the fuel system should the regular wind-driven pump fail.

In addition to the above items, some *D.H.5's* were equipped with an electrical generating system for night flying.

Armament of this airplane consisted of a single Vickers machine gun located in front of the pilot to his left and synchronized to fire through the propeller. The interrupter control was of the hydraulic type, controlled by a flexible cable attached to a trigger on the stick. The .303 cartridges were carried in a disintegrating type metallic belt, the shells forming the link pins. After discharge, the links fell into a box beneath the machine gun.

Fuel tanks were located directly behind the pilot. These were two in number; a 100 litre tank for gasoline, and a 21 litre oil tank. Flow was caused by air pressure. An additional tank of 26 litres capacity was located on right upper wing, just outside the center section. This tank was streamlined and flowed by gravity. Filler pipes for the two fuselage tanks were in the pilot's headrest. Fuel capacity was sufficient to give the *D.H.5* a range of 200 miles, or an air endurance of 2 hr., including take-off, climb to operational altitude and return to base.

The *D.H.5* landing gear was unusually simple. Front and rear struts were made in right- and left-hand units, joined at their lower extremities by a steel fitting on each side, the entire held together by bolts. The one piece steel tube axle was held in place by rubber shock cord. The springing range was not limited in any way. Round bar steel spreaders were bolted in front of and behind the axle to maintain an even tread, and the whole assembly was stiffened by wire bracing in the plane of the front struts. Struts themselves were made of wood, turned to a good streamline form. Tail skid was conventional, made of hardwood hinged to a cross piece on the bottom of the fuselage, and sprung internally on rubber cord.

Flight Surface Construction. *D.H.5* wings were designed for ease of production by making right and left, upper and lower panels as alike as possible. Both wings were of equal span and chord, ailerons were dimensionally the same and the upper and lower center sections were almost identical.

Wing spars were solid spruce spindled out to an I section, and were connected by steel tube compression struts, the bays thus formed were in turn cross-braced with steel wire. Each panel had 10 full ribs, spaced from 280 to 350 mm. Between each two ribs were two false ribs on the upper wing surface only, extending from the leading edge to the front spar. The leading edge was milled from solid wood to conform with the nose contour of the airfoil, and wooden wingtips and trailing edges were employed. Wingtips were reinforced by a single short rib.

Construction of the ailerons followed that of the wings. These members were 8' 4" in span, with a chord of 16". They were hinged directly to the rear main spar.

Both upper and lower center sections spanned 60", and were similar in construction to the wings. Upper center section struts ran from the ends of the section where suitable fittings were provided, to fittings on the upper longerons. Lower center section was bolted directly to the forward fuselage section described previously. Fittings in both upper and lower center sections were attached directly to the spars.

Wings were rigged at a basic positive incidence of 2°, at the center, increasing to 2-1/2° at the tips. Some *D.H.5* models carried 2-1/2° throughout the lower wing. Dihedral was 4° in each right- and left-hand panel in some examples, 4-1/2° in others, making a total of 8° and 9°, respectively. Wings were staggered at 2' 3".

Empennage of the *D.H.5* consisted of fixed vertical and horizontal surfaces and unbalanced rudder and elevator. It will be remembered that in the prototype only was a balanced rudder used. These surfaces were framed in wood, except for metal tube leading edges on the rudder and elevator.

The horizontal stabilizer was bolted to fittings directly attached to the upper longerons and was supported by a strut on its under surface running in the plane of the leading edge, to the lower longerons. It was further braced underneath by a steel cable, and above by a cable running to the vertical fin.

The latter member was triangular in shape, bolted into place, its lower rib curved to fit the upper surface contour of the stabilizer. Rudder and elevator were strap-hinged to the fixed members and were actuated by exterior control horns. Control cables entered the fuselage through leather patches in the fabric.

The empennage was rigged: vertical fin was square with the fuselage; horizontal stabilizer was set at 1° positive incidence. Incidence could be changed on the ground, but there was no arrangement for trimming in flight.

Except for metal fairings already described, the *D.H.5* was entirely fabric covered. Covering was sewn to the wings and tail surfaces, but laced to the aft section of the fuselage.

While the *D.H.5* has been overshadowed in fact and fiction by many other fighter types, it nevertheless was an important step in the development of military aircraft in W.W.I.

Stunt Outlook for '51

(*Continued from page 11*)

maneuvers are so rapid that a judge has the greatest difficulty in following them. Actually, the maximum power required by any stunt model is just enough to pull the model straight up. The largest stunt models on the market today will all fly the complete pattern quite nicely with a good 29 in the nose.

Of course, one of the prime requisites for successful stunt flying is a good, reliable fuel tank; but so much good advice on this subject has already been published that no more should be necessary here.

The landing gear makes a difference too, since 20 of the 335 possible flight points depend on its functioning properly. The wheels should be located slightly forward of the leading edge of the wing; the idea being to let the tail come up as quickly as possible, prolonging the take-off run so that the model doesn't make an unrealistic (and point-losing) leap into the air. And, contrary to general opinion, a rearward wheel location results in smoother landings. The landing struts themselves should be nearly rigid. A little fore-and-aft movement is all right, but any sideways or twisting action is disastrous to smooth take-offs and landings. Large enough wheels should be used to allow easy take-offs from, and landings on, the usual rough contest site.

One item that no one seems to give much thought to is the lowly push-rod. In most stunt models, the push-rod is absolutely free inside the fuselage. In flight, the airstream exerts a considerable neutralizing force on the elevators, and when the up line is pulled, the bellcrank moves, but the elevators may not; the push-rod bending instead. When this occurs, the pilot has less than no control at all over the model's flight. To avoid this sad state of affairs, insert a small plywood bulkhead in the fuselage, halfway between the bellcrank and the elevator horn. If the push-rod is passed through a close-fitting hole in this bulkhead, no bending can possibly occur.

A small amount of sweep-back in the lead-out wires is essential for smooth control, since the control lines themselves sweep back from the model in flight. Lead-out sweepback does not help to hold the lines tight, but it does keep the lead-outs from being bent where they leave the wing guides, and eliminates the binding that this causes.

The balance point of any stunt model reflects a compromise: the more nose-heavy a model is, the harder it pulls out on the lines; and the further back the cg, the more maneuverable (and sensitive) the airplane. The best practice is to balance the model at the point where the front leadout leaves the wingtip. This should be about a third of the way back from the leading edge on a model with flaps, and about a quarter of the chord back for a model without flaps. The center of the bell-crank should be even with this point, automatically giving the proper leadout sweepback.

The rudder should never be offset more than 20°; 10° to 15° being about right for most stunt models. If offset thrust is used, it should be just enough to be barely noticeable from the top. Weight in the outboard wingtip should be just sufficient to make that wing hang a trifle low when the completed model is balanced on its centerline. Don't go overboard in trying to keep the lines tight by doing things to the model, since the only result of excessive offsetting is to make the model "crab" outward in flight, ruining its maneuvering ability.

A stunt model should have enough pull on the lines so that the flier can rest easy in the knowledge that the ship won't come in at him, but not so much that it becomes a strain to hold on to the handle towards the end of the flight. Excess line pull is the result of either too much speed, or "crabbing"; both of these being serious evils in themselves. "Crabbing" can be easily detected by the flier; if both of the model's wheels are visible from the center of the circle during flight, then the model is flying sideways, and the motor or rudder

offset must be reduced. Excess speed can be corrected by running the engine a little rich, or by installing a smaller motor.

Any points which are not mentioned in the preceding discussion are either common practice (weighting the outer wing-tip, offsetting the thrust line slightly to the outside of the circle, etc.) or optional with the modeler. (For example, the vertical position of the thrust line seems to make no difference in the performance of a stunt model.) And now, having covered the requirements for a good stunt ship, some advice on flying technique might be in order.

The first and foremost requirement for a good stunt pilot is confidence. He must be confident of his airplane—and of himself, and his ability. And the only way to breed confidence is through practice. This does not mean that four or five hours of flying a day is necessary. Several flights a week should be all that is needed, provided the flier keeps constantly trying to improve his pattern. It is a good idea to have an experienced stunt pilot watch occasional flights from outside the circle, as do the judges at a contest, to point out the bad and the good maneuvers in the pattern.

Be familiar with the rules—all the rules—and obey them. And don't be the character, a familiar sight at all contests, who is continually annoying the judges with trivial questions about the regulations. In fact, don't annoy the judges with trivial questions about anything, such as, "Hey, when is it my turn to fly?" and "How many points have I got?" Most judges have very good memories for such people—especially when their flights are being scored. After all, judges are human too.

When it is your turn to fly, be ready. Even if you're not sure when your turn is coming up, be ready anyway. And, once you get in the circle, make the most of your opportunity. Maybe your maneuvers aren't perfect. But, if there isn't too much wind, you can make them look a lot better (to the judges, anyway) than they actually are. (This method, described below, does not constitute cheating or poor sportsmanship. It is widely used by those contest fliers that know about it, and kept a deep secret from those who don't.) Let's go through a pattern to show you what I mean.

First, your model should have been all fueled up, primed, and ready, before you even took it into the circle. If you've done this, it should be a simple matter to start the engine and become airborne within the allotted minute. And there's five points. Take off directly down-wind, using a little down to keep the tail high and the model on the ground. If you can stretch the take-off to about a quarter-lap, you're a cinch to get full points for it. Before you give the judges your starting signal, fly around for a few laps to get the feel of the airplane, and to make sure that the engine is running properly. Now, any time you're ready, give the signal, and make it noticeable!

If you've got a good model, level flight is a snap. Just hold on to the handle and the airplane will do the rest. Do your climb and dive directly in front of the judges. It takes exceptional (and rarely encountered) ability for a judge to follow these maneuvers close up and still be able to pick out the flaws. Don't forget the level lap after each maneuver—you've got to give the judges time to mark down your (phenomenal) score.

Really good wing-overs are almost as rare as four-engine free-flights. It takes a real pilot to split the circle exactly in half, as the rules specify, but if you can't quite do it perfectly, don't despair. Just do your wingover parallel with the judges' stand, and to them it will look spiffy. Don't worry too much about the 60° maximum height on your loops, since you can do 40′ loops on 50′ lines and still be under the limit. Of course, the judges may not know that, so better not make them quite that big. If your loops tend to travel back and forth a little, do them facing at right angles to the judges. If your loops vary slightly in height, or aren't quite the same size, do them in front of the judges. Naturally, if you know that your loops (or any other

maneuvers) are letter-perfect, do them where the judges can see them best: about 45° to the judges' right.

Inverted flight is just as easy as flying level right-side-up. Any nervousness here is only a state of mind, so forget it. And now let's go on to the horizontals. The horizontal eight is an extremely difficult maneuver to do properly—unless you know how. The rules say that both ends of the eight must be round circles, and that the model must be in a vertical position at the center. It is a little unnerving to have to dive straight at the ground just before starting each half of the eights, but, if you do the outside loop first, so that the model points straight up instead of straight down in the middle, then there's nothing to it.

Vertical eights are next, and, like the horizontals, they should consist of two circles meeting at the center. If you're not absolutely sure of yourself on these, do them in front of the judges too. Overhead eights are a little tough, but if you face at right angles to the direction of the eights, you won't be so far off balance from leaning over backwards.

All there is to the square loop is four quick jerks of the handle, and now you're ready for the special maneuver. Don't pick something easy, like inverted square loops or rolling your wheels, because, even if you do it perfectly, you won't get as many points as you will if you try something really hard; a square horizontal, for instance; whether you do it well or not.

Now, all you have to do is go around with the model until the engine quits, land, and it's all over. The landing is just another maneuver that you can leave to the airplane. Just keep the handle in neutral, and don't move it, not even the tiniest bit! and the model will make the prettiest landing you (or the judges) ever saw.

What will the trend in stunt models be in 1951? Well, the most noticeable change will be in the appearance of the models. More and more realism will become evident as the season progresses; profile jobs will become an unfamiliar sight at contests as the stunt modelers concentrate on building ships that look like real airplanes. Manufacturers, too, will take up this trend, some (as Sterling has already done) producing exact scale stunt models.

Models will become smaller, the "flying barn doors" rapidly disappearing and being replaced by smaller, neater, and better-proportioned ships—and capable of better performance, too. Most stunt jobs will be in the .29 to .35 class. Only a few die-hards will continue to use the 60's, and even an occasional Class A model will end up in the winner's circle. There doesn't seem to be much chance of the AA achieving the same standard of performance as the larger ships during the coming year, although even that is not impossible, and some of the larger contests may include a special class for the under-.10 stunt models.

Plane on the Cover

(Continued from page 34)

ing edge gave the wing strength. The whole design was kept free from accessories and anything else that could consume weight without adding something vital to the operation.

For example, the instrumentation proved simpler than that used in a U.S. primary trainer; there was no armor plate other than a small set of deflectors set at an angle at the pilot's elbows. The assumption appeared to be that the engine itself would protect the pilot's rear, and that no one in his right mind was flying into the pilot's guns. Angle shots from the rear were the major hazard, and some protection was provided here.

Communications equipment was of the simplest possible nature, a one-band transmitter and receiver, equivalent to our Command set. The place where weight was invested was in armament—the original *MIG-15* carried four electrically-fired 15 mm guns, equivalent to our late World War II .60 calibres. These have been alternated for 20, 32 and 52 mm cannon, or 60 mm spin-stabilized rockets, fired from a set of repeating launchers, lying flush against either side of the fuselage. Sensible provision has been made for self-sealing tanks, which appears to be the major concession to personnel safety.

To date, the Reds in Korea and China have not shown any tactical usage of the *MIG-15*. The craft was originally designed as an interceptor, to pull down any of our *B-36's* that might come to visit. For that reason, pressurization equipment is reported to be very carefully designed. The pilot's cockpit is pressure-tight, kept at proper pressure by bleeding a little air from the compressor-stage of the engine. Cockpit cooling is achieved by the use of a small air-cycle refrigerator, where the compressed air, taken from the Nene-Chelomey engine's compressor stage, is expanded over a turbine, thus producing a cooling effect. This is necessary, since the skin-friction, high-altitude sunlight, plus transferred heat from the engine can raise cockpit temperatures to well over 180° F.

To this writing, the *MIG-15's* have not been used as tactical rocket launchers, although pilots of European transport aircraft who have been buzzed by playful *MIG-15* pilots, have seen them with what looked like four to six 4" rockets slung under the wings. Whether these were air-to-air or air-to-ground projectiles is problematical at this point.

The *MIG-15* has an interesting but peculiar background. The Mikoyan-Gurevich team first achieved public note with their MIG-1, a liquid-cooled fighter that was shipped to Spain in small numbers during the latter days of the Civil War in 1938. This aircraft was followed, in 1940, by the *MIG-3*, a similar low-wing monoplane, powered by a liquid-cooled engine. While these planes did not receive the publicity that went to the *Yak 7's* and *9's*, they were considered excellent machines. German bombardment wrecked the plants in which they were built, so the type faded from view toward the end of the war. By 1945, a fast fighter, sporting a 1750 hp radial engine, appeared under the designation of the *MIG-5*, and was seen on Soviet Aviation Day of 1946, with a German-designed Walters rocket engine in its tail for boost power.

The first Russian jet aircraft was the *MIG-7* that was mentioned by Major Gen. M. Savitski of the Red Army Air Force during the Spring of 1945, when he announced that Soviet jet aircraft had accompanied Red bombers on a trip over Berlin. While there was no report of contact with the Luftwaffe fighters, it did indicate that the planes were in existence and were flyable arcraft. The MIG-7 is reported to have been simply an MIG-3 airframe with the liquid-cooled engine removed and a jet engine, a copy of the German Jumo 004 engine fitted to the lower forward section of the fuselage, and faired in. The airplane proved flyable but not much faster than the piston fighters of its time. This design was soon replaced by the MIG-9 which was the first Russian jet seen in numbers by Allied observers.

By 1947, this design was observed in full group strength in various parts of the Soviet Union. The MIG-9 was obviously a jet-conversion of the MIG-5, powered this time with two Russian versions of the BMW-003 or the Junkers Jumo 004H engine. The lines of virtually all the early Russian jets indicated that they were adaptations of propeller driven fighters.

The arrival of the Rolls-Royce Nene and Tay engines from England in 1946 and 1947 made great differences in the entire completion of Soviet jet design. The original Russian contract called for 60 engines plus information. Around one of these engines, the team of Mikoyan and Gurevich built MIG-11, a shoulder high-wing monoplane, the first original-for-jet design in Soviet history. The prototype was flown powered by two BWM engines, which were soon supplanted by a single Nene copy. This design, with its barrel-like fuselage and thin single boom supporting the tail was supposed to go into major production, when reports on two test types became available in Russia.

As sort of a side-issue, General Lavochkin and the Mikoyan-Gurevich teams had drawn up jet adaptations of the DFS-8346

rocket plane, Germany's proposed rocket-powered successor to the Me 163 "Komet." These two ships had been produced independently at the "prototype farm" at Ulan Bator, deep in Siberia. The results were so good that Mikoyand and Gurevich were ordered to stop work on the MIG-11 and adapt the information about 35 degree sweepback on wings and tail to a first-line interceptor fighter. This directive evidently went to all designers working on fighter planes. It is reported that compliance with this request marked the parting of ways between Mikoyan and Gurevich.

The first *MIG-15* (Mi-1 really) was reported to have flown in May of 1947. By 1949, they flew over Moscow in group strength, and by early 1950, the USSR had sufficient production in these planes to supply them to Red China and to the so-called police of the Eastern Zone of Germany. Production on this aircraft, at the end of 1950, was reported at 200 aircraft per month.

There are certain basic conclusions that can be drawn from the examination of the *MIG-15* its background and its performance:

That it is a competent airplane, no better and no worse than similar U. S. and British types.

That it is more producable, not because the Russian production system is any better, but because Russian designers and procurement personnel are little concerned with various gadgets and accessories. In brief, the Russian fighter is a simpler machine and weighs a lot less.

Lined up, side by side with parallel U. S. and British types of the same power and vintage, there is a high degree of similarity between all aircraft built for the same purpose. They stem from the same body of design science, basic ideas that were captured from the Germans. Power plants are highly similar.

The important difference, in a small degree, is the larger factor of risk that the top level Soviet air planners are willing to accept for their pilots. In a larger measure, it is the absence of weight-consuming gadgets and accessories that not only increase the cost and complicate maintenance but jack up wing loading which in turn reduces maneuverability and climb.

The Amazing Bird

(*Continued from page* 19)

and consequently justify the construction effort. Tissue is attached to all wing surfaces with plasticized dope (to prevent warping the thin sheeting), with edges being lapped under a bit. Plasticized dope is made by mixing enough castor oil with clear dope to prevent curling of a paper sample when doped.

The basic fuselage is composed of sheet balsa sides and a few formers. Assembly is simple and easy though particular attention should be paid to alignment. Before the turtle deck sheeting is applied, the tail and control system must be mounted. Since the bellcrank would be difficult to get at after final assembly, install it carefully, using a pack nut on the pivot bolt and fastening the lead-out wires securely. The pushrod is notched into the formers, the notches later being plugged to form guides. The horn, like the bellcrank, is made of aluminum or thin dural, crimped and cemented to the elevator. Fabric hinges need not be large and unsightly—thin broadcloth, cut on the bias, serves adequately for this size model. Cover the tail surfaces with tissue and see that the controls move freely.

Add the landing gear at this point. Its main members are bent of 1/16" steel wire, the other struts of .032" dia. Smooth surfaced electrician's tape, similar to masking tape but with stronger adhesive, was used to wrap these wires to scale diameter, the advantage being that it can flex without breaking. Small *Veco* wheels which were very close to true scale were fitted after the aluminum hub sides had been ground off flat.

After installing the fuel tank, the top sheet decking is fitted in pieces and mois-

tened on outer surfaces during assembly. Cockpit cutouts are made before the pieces are attached. The lower wing is cemented into the curved seat provided for it.

Wing struts, cut and shaped of 1/16" plywood, require some patience to produce (emery boards are handy for sanding them), but the reward comes in ease of wing assembly. The points of strut attachment are carefully marked on wings and fuselage, and openings are made with a pointed tool at approximately the correct strut angles. Then, using slow drying cement, the struts are fastened to fuselage and lower wings by cementing and forcing the pointed spurs into the slots. Make a trial top wing assembly—a sort of dry run—without cement to see that there are no drastic errors in attachment points or strut lengths, then mount the upper wing permanently. True alignment can be had by altering the depths to which the struts penetrate the wood. Apply several coatings of cement to strut joints. The wire wing guide is cemented to the left outer strut and bound with tissue strips.

From the start, the cowl is shaped of two blocks which meet on the vertical center line. These are fitted, separated and hollowed, then joined again after necessary inside clearance has been made.

Apply tissue in small pieces, lapping as necessary to complete the covering over fuselage and cowl. Such detail parts as exhaust stacks and spinner are added of balsa scrap, the windshields are thin celluloid.

Finish the model as you like, whether with colored dopes followed by fuel proofer, or *STA* or *Aero Gloss*. Balance is not critical, but ought to fall near the top wing leading edge for easiest flying. Fly the model indoor, or outdoors in calm weather on smooth surfaces, using 30-40 foot radius lines of nylon or lightweight fishing line.

Official News

(*Continued from page* 18)

District VI (KY., IND., ILL., & MO.) Vice President: Dutch Hess, 137 1/2 E. Lincoln, DeKalb, Ill.; Contest Board: Peter Vacco, 4652 Milwaukee Ave., Chicago, Ill., Anthony Grish, Box 52, St. John, Ind.

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Since the establishment of the guiding principle of, *by, and for the model builder*, your *AMA* has progressed to such a degree that each and every one of you licensed modelers has the opportunity to vote for national officers of your choice. Only for a few years has this privilege been enjoyed by all. In fact, the officers as late as 1947 were elected by vote of Leader Members only. During the presidency of E. N. Angus, AMA bylaws were amended so as to extend this opportunity to all licensed flyers.

Many of you know that the rules under which you fly are determined by a vote of elected Contest Board Members. Before sending suggestions and rule votes to the Contest Board Chairman, Contest Board

Members canvass their districts getting the many and varied opinions of modelers. In some instances, this is done by actual contact, but often it is not possible for this to be done and the only way your Contest Board Member can know what you want is by your letters to him.

Vice Presidents form the bulk of the Executive Council which is empowered to supervise the affairs of AMA and adopt policies, rules, and regulations for conduct of business as deemed advisable. They have been active in formulating district and regional associations of model clubs and settling local conflicts that sometimes arise.

5th Internationals Announced. Warren Bartlett, Plymouth Contest Manager, announced that the week of August 20 through 27 has been selected for the 1951 event. As in previous years, plans are to hold free flight events on the huge Selfridge Air Force Base and control line events on Belle Isle.

Last year's *International Model Plane Contest* showed a definite lack of participation in some events. To achieve more competitive events, some of the classes that proved to be less popular have been combined. The tentative schedule is as follows:

Freshman Contestants: Outdoor Rubber (stick-cabin combined); Hand-launched Glider; Free Flight Gas, Class AA; Control Line Speed, Class AA and A; Control Line Stunt, classes combined.

Junior and Senior Contestants: Outdoor Rubber (stick-cabin comb.); Free Flight Gas, Class AA, A, and BC; Control Line Speed, Class A, B, and CD; Jet Speed; Control Line Stunt, classes combined; Flying Scale, classes combined.

Junior-Senior (Comb.): Team Racing; Navy Carrier Event; Combat.

New U. S. Record. Ward Wilkinson, last November 26th at the *San Bernardino Flying Wheels' 1st Annual Free Flight Contest*, broke the Junior Class AA Free Flight Gas record with a flight total of 13:32.0. Ward, a Los Angeles, California boy, used a *Wasp .049* in his 6 oz. model which shows a resemblance to Denny Davis' Hogan series and has 195 sq. in. wing area. Prop used was a *Kayshun* 5 1/2" D x 4" P.

One of the most noteworthy clubs to recently receive AMA Chapter Charter is the *Peninsula Aero Model Club*. Their Bylaws and Constitution are fine examples of work that can be produced by a well organized club working together. Club President and Senior Advisor is John Carroll. Membership is open to all AMA license holders residing or having connections in Somerset County, Md., and south on the Delmarva Peninsula. Anyone desiring membership in this active club should get in touch with E. V. Davis, Secretary-Treasurer, at 614 Market St., Pocomoke City, Md.

Do you belong to a model club? You're missing an important and enjoyable part of the activity if you don't. Ask your hobby dealer if there is a club in your city or write AMA to inquire if there is a chartered club in your vicinity. Perhaps there is no club nearby. Then get together with your modeling friends and write AMA, 1025 Connecticut Ave., Washington 6, D. C., for informative literature on starting one. If you've never belonged to an active club, you don't know what you're missing.

The Federation Aeronautique Internationale, world wide governing body for sporting aviation, announced in their Information Circular No. 48 that they have granted sanction to the *Aero Club of Finland* to hold the *International Wakefield Cup Contest* on the 7th and 8th of July. Site of the event once more is Jami Jarvi.

Also announced by F.A.I. in the circular is that many new international model aircraft records have been accepted. These records are international in status and are not to be confused with National AMA Records.

Gas Models, Duration—4 hr. 30 sec. Record established by Lev. Sikirine (Russia) using a motor of 9.8 cc. on August 18, 1950. This flight also holds the World Duration Record since it exceeds the duration record for all other categories.

Gas Models, Control Line Speed, Category II—192.240 km/h. (119.452 mph.). Rec-

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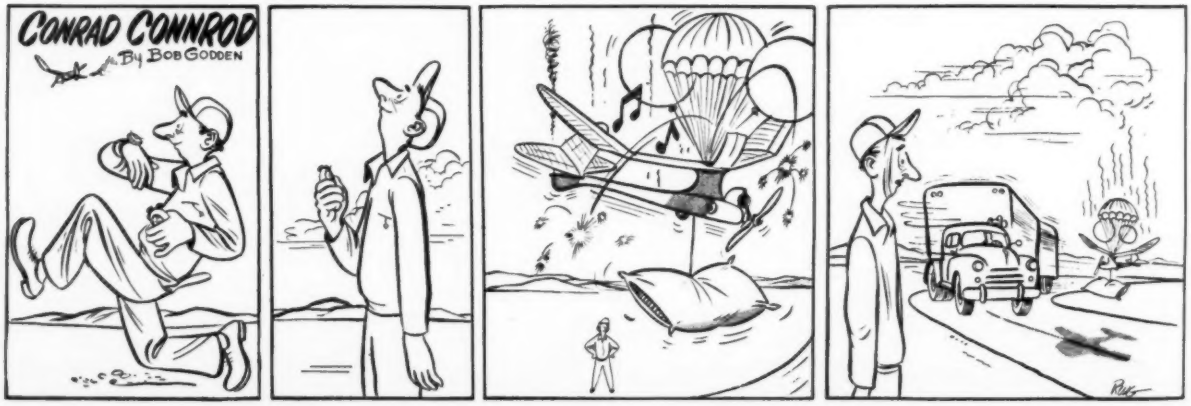

ord established by Robert Labarde (France) using a 4.81 cc. motor on July 9, 1950.

Jet Models, Control Line Speed—179.388 km/h. (111.466 mph.). Record established by M. Georges Benedek (Hungary) using a "Dynajet" on June 4, 1950.

Rubber Models, R.O.W., Duration — 54:4. Record established August 23, 1950, by M. Greza Egervary (Hungary).

Gas Models, R.O.W., Duration—2 hr., 50 min. Record established by M. Mikhail Vassiltchenko (Russia) using a 4.4 cc. motor on July 28, 1950.

Gas Models, R.O.W., Distance—87.106 km. (54.125 miles). Record established July 19, 1950, by M. Pavel Smirnov (Russia) using a 4.42 cc. engine.

Gas Models, R.O.W., Control Line Speed, Category I—70.056 km/h. (43.531 mph.). Established by M. B. Vassiltchenko (Russia) on August 16, 1950, with a 1.96 cc. motor.

Gas Models, Special Aircraft Duration—27:35. Record established August 18, 1950, by M. Youry Khoukhra (Russia) using a 1.8 cc. engine.

Gas Models, Special Aircraft, Distance—12.201 km. (7.581 miles). Established by M. Youry Khoukhra (Russia) with an engine of 1.8 cc. on August 14, 1950.

Gliders, Special Aircraft, Duration—2 hr., 27 min., 55 sec. Record established May 14, 1950, by Francois Banki (Hungary).

Rubber Models, Flying Wing, Duration—35:42. Established on August 23, 1950, by M. Mihaly Kiraly (Hungary).

Gas Models, Flying Wing, Duration—1 hr., 35 min., 15 sec. Record established by M. Boris Parparov (Russia) using a 4.4 cc. engine on August 12, 1950.

Gas Models, Flying Wing, Distance—16.247 km. (10.095 miles). Established July 19, 1950, using a 4.42 cc. engine by M. M. Koupfer (Russia).

Gas Models, Flying Wing, Speed in a straight line—49.680 km/h. (30.870). Record established by MM. B. Martinov and A. Rakov (Russia) on August 12, 1950, using a 4 cc. engine.

Gas Models, Flying Wing, Control Line Speed, Category II—99.288 km/h. (61.695 mph.). Established by M. V. Simonov using a motor of 4.4 cc. displacement on August 12, 1950.

Gliders, Flying Wing, Duration—36:5. Record established on May 21, 1950, by M. Jean Melichar (Hungary).

Gliders, Flying Wing, Distance—20.850 km. (12.956 miles). Established by M. Bela Jancso (Hungary) on April 9, 1950.

All foregoing records, unless specifically stated, are for rise-off-ground orthodox (conventional separated lifting and stabilizing surfaces) models except in the case of special aircraft where lifting surfaces are mobile.

For comparison, it should be noted that the time listed for International Duration Records is one single flight with no limit on engine run, whereas for National AMA Records, the total of three flights with a limited engine run is taken. Records listed for distance, altitude, and control line speed represent one flight. The record for speed in a straight line represents the average of two flights over a measured course of 164 feet for rubber models or 328 feet for gas.

News of Modelers

PEN-PAL SEEKERS: Bengt Wesslen, Box 288, Nol, Sweden, interested in U-control and would like to correspond with an American modeler of around 15 years old . . . A. T. Leffs, 124 High Street, Aylesbury, Bucks, England, is Secretary of his local modeling club. Interested in corresponding with American modelers . . . If you are looking for a pen-pal interested in AA payload, write to James Deck, 713 Academy St., Valparaiso, Ind. . . . Simon Dunn, Secretary of the Phoenix Aeromodelling Club, Abyad MEAF 15, Egypt, writes that members of his club wish to correspond with American modelers . . . Albert de Jong, P. Gyrenlrugstraat 27, Amsterdam, Holland, is anxious to correspond with a New Yorker around 15 years old . . . C. A. Stanton, 25 Raeburn Road, Pheasey Estate, Great Barr, Birmingham, England, wants to exchange magazines, engines.

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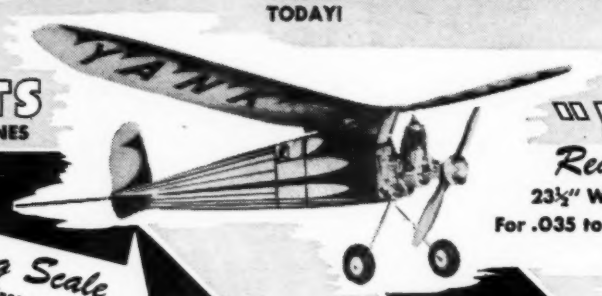

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